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GONOCOCCAL INFECTION IN THE MALE

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BY

ABR. L. WOLBARST, M.D.

UROLOGIST AND DIRECTOR OF UROLOGIC CLINICS, BETH ISRAEL HOSPITAL; CONSULTING UROLOGIST, CENTRAL ISLIP STATE HOSPITAL, MANHATTAN STATE HOSPITAL, AND JEWISH MEMORIAL HOSPITAL, ETC.

WITH A CHAPTER WRITTEN BY

J. E. R. McDONAGH, F.R.C.S.

Surgeon, London Lock Hospital, Late Hunterian Professor, Royal College of Surgeons, etc., London, England

WITHDRAWN

*WITH EIGHTY-NINE ILLUSTRATIONS, INCLUDING SEVEN
COLOR PLATES*

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To my good friend
PHILIP M. QUAS-COHEN
of Manchester, England,
this book is affectionately
dedicated

PREFACE

Although urology, as a specialty, has made marvellous progress within the past two decades, principally along the lines of major urinary-tract surgery, there has been, nevertheless, a considerable advance in our knowledge of the treatment of male gonorrhea and its complications. This therapeutic advance has been most marked as regards physical therapy, intravenous and local medication, protein therapy, and most important of all, in the epochal work of Belfield and his associates, on the seminal vesicles.

It is the aim of this book to record this advance in our knowledge in such a manner as to offer the practitioner, usually the first to be consulted by the gonorrheic, a working familiarity with the present-day methods of diagnosis and treatment, based largely upon my personal experience. If there is any particular message which I would convey, it is that gonorrhea, considered as a pathologic entity, is worthy of our most serious study and that gentleness rather than vigor in therapeutic attack is the keynote to successful results.

Because this volume is intended primarily for the general practitioner, emphasis has been laid upon certain diagnostic and therapeutic features usually not found in current textbooks on urology. Among these may be mentioned the urinary tests, which I consider of major importance in diagnosis, and the numerous instrumental aids both to diagnosis and therapy, with which the specialist is, and the practitioner ought to be, familiar. This accounts for the copious employment of illustrations and descriptions of instruments, indispensable in the treatment of male gonorrhea, but seldom found in the practitioner's armamentarium.

It is deemed a great privilege to include in the text a chapter by J. E. R. McDonagh, F.R.C.S., the distinguished English

surgeon, in which he gives his unique views on gonorrhea—views which every urologist and practitioner can read with profit.

My thanks are extended to my respected colleagues, Drs. H. H. Morton, B. C. Corbus, O. S. Lowsley and Georges Luys (Paris), for permission to use illustrations from their writings; to the editors of *The International Journal of Surgery* and *Medical Life*, for permission to use matter which appeared originally in their journals; and to the instrument makers (whose names appear in the text) for the loan of cuts of urologic instruments.

A. L. W.

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GONOCOCCAL INFECTION IN THE MALE

CHAPTER I

INTRODUCTION

"Au commencement, Dieu crea le ciel, la terre, l'homme et les maladies vénériennes." In these words, Ricord, the famous French venereologist, facetiously expressed the generally accepted conviction that the venereal diseases enjoy an antiquity probably as old as Man. There is undisputable evidence which shows that the Chinese were acquainted with gonorrhea more than five thousand years ago, while the comparatively modern Bible describes the disease clearly and enjoins strict quarantine measures against its dissemination (Leviticus, xv). Luys, probably the best known French urologist, is authority for the statement that circumcision was invented for the purpose of guarding against balanoposthitis, one of the most common complications of gonorrhea. Hindoo, Arab, Greek and Roman writings likewise indicate that these people were sufferers from this disease, which is today one of the most difficult medical and social problems with which civilization has to cope.

During this long period in history, no distinction was drawn between gonorrhea and syphilis. These were thought to be different manifestations of a single disease, until 1831, when Ricord, in Paris, and Bell, in Edinburgh, showed that they were two distinct entities, each with its own etiologic virus. In 1879, Neisser discovered and demonstrated the gonococcus; in 1885, Bumm inoculated the human urethra with pure cultures of the organism, thereby proving beyond all doubt that the gonococcus was the specific etiologic factor in the development of gonorrhea.

As a result of these discoveries, the entire medical conception of this disease has changed. What was considered until that time nothing more serious than a cold, is recognized today as a serious infectious disease with lamentable potentialities. The day has happily passed when it was thought proper to regard the gonorrhoeic in the light of a sinner deservedly paid for his sin and unworthy of sympathy. The general attitude of medical men toward this disease until very recent years, is well illustrated by the classic story of the Irish medical student, who, on being asked how he would treat a case of gonorrhea, replied "with contempt." We now look upon gonorrhea as a formidable menace to society, universal in extent and perhaps the most common human ailment,—an infection capable of reaping its greatest harvest of invalidism, cachexia and even death itself, upon young men and women who have been kept in complete ignorance of its mode of acquisition and its consequences, because of prudery and in the interests of a false "morality."

Neisser's epoch-making discovery demonstrated that gonorrhea, being produced by a specific microbe, can be transmitted only through the physical transfer of the germ from one host to another; he thereby established the fundamental basis for the diagnosis of the disease, as well as its prophylaxis and therapy.

Gonorrhea is peculiarly a disease of adolescence, acquired through sexual congress most frequently during that period of life when the sex impulse begins to make itself strongly manifest. Reliable statistics show that approximately 50 per cent of boys and girls in schools, high schools and colleges are sexually active and that gonorrhea is not at all rare among them. It is generally agreed that a considerable proportion, probably 60 per cent of all adult males have suffered from gonorrhea at one time or another. How many females are infected, can only be surmised. It is hoped, however, that with the introduction of personal prophylaxis and with a growing tolerance toward sex education, the incidence of geni-

tal gonorrhea ultimately must be reduced considerably. The World War served at least one useful purpose when it brought a knowledge of sex and personal prophylaxis against venereal disease within the purview of the average man and woman.

Economic Aspect

From an economic standpoint, gonorrhea stands close to tuberculosis and syphilis as a great social plague, probably the greatest. Gonorrhea affects not alone him who has the disease, but those who are dependent upon him for support. The annual loss of wages for work days lost through gonorrhea and its complications amounts to millions of dollars. Add to this the diminished earning power of the innumerable neurasthenics, chronic invalids and cripples whose condition can be traced to this disease and we have a total economic loss that is almost beyond computation.

More important than this great financial loss is the relation which gonorrhea bears to marriage. To what an appalling degree women are made innocent victims through the men they marry cannot be estimated. Years ago, Nöggerath held the opinion that 80 per cent of women suffered from the effects of acute or latent gonorrhea. While that estimate might have been too high, it is undoubtedly true today that more than 60 per cent of all gynecologic surgical operations are the direct or indirect result of gonococcal infection and that gonorrhea has unsexed more women than all other diseases combined (Sturmdorf).

No less startling is the rôle of gonorrhea in the causation of sterility and depopulation. In the male, sterility is produced most commonly as the result of epididymitis; latent gonorrhea of the prostate and seminal vesicles may accomplish the same result through the chronic infection and deterioration of the seminal fluid. In the female, childlessness most frequently depends upon the presence of metritis, cervicitis and salpingitis, all of which develop after gonococcal infec-

tion. Of all cases of childless marriage, the husband is the sterile member in 40 to 50 per cent of cases.

In the production of blindness, gonococcal infection stands high. Ophthalmia in the adult is not rare. It is produced by carrying the infectious discharge to the eye, either by the hand or through instruments, linens, etc. In infancy, the infection usually is derived at the time of passage through the infected vaginal canal of the mother, or shortly after birth, through contamination by dressings, towels, or the infected hands of doctors or nurses. According to the National Committee for the Prevention of Blindness, 19.5 per cent of the total number of pupils (4,151) in the 48 schools for the blind, in 1922-1923, were sightless through ophthalmia neonatorum.

Bearing these facts in mind, we feel justified in designating gonorrhea as one of the most formidable and widespread of all the dread evils to which mankind is subject.

CHAPTER II

ANATOMY

A brief consideration of the anatomy of the parts usually involved will be of value. The matter is simplified when we regard the genitourinary tract schematically as roughly resembling the letter Y (Fig. 1). One of the arms represents the urinary tract, that is, the kidneys, ureters and bladder, and the other arm represents the genital tract. This in turn consists of the epididymes, testes, vasa deferentia, seminal vesicles and ejaculatory ducts; the latter open into the prostatic urethra, one on each side of the median line. At this point the urinary arm meets the genital; both unite to form the stem of the letter, namely the urethra, or the common urogenital canal. For present purposes we shall not consider the urinary arm of the letter. The bladder, ureters and kidneys are not exempt from gonococcal infection, but this happens comparatively rarely and we need but mention it here in passing.

The Urethra.—This portion of the genitourinary tract is between seven and eight inches long and is divided anatomically and pathologically into an anterior and a posterior portion. The former extends from the meatus urinarius backward to the anterior layer of the triangular ligament; it is about five and a half or six inches long, and its caliber varies from 27 to 30 French, except at the meatus, which has an average normal caliber of 28 French. The posterior urethra extends from the anterior layer of the triangular ligament backward to the bladder. Its total length is about two inches and it is divided into two portions, known as the membranous and the prostatic portions of the posterior urethra.

The membranous urethra is that portion included between the anterior and posterior layers of the triangular ligament;

it is from three-quarters to one inch in length, poorly vascular, and has an average caliber of 27 French. The slight vascularity of this part of the canal renders it perceptibly free from severe invasion by the gonococcus and subsequent stricture formation.

The prostatic urethra adjoins the membranous portion and lies wholly within the prostate. It is also known as the bladder neck, owing to its anatomic relationship to that viscus. The prostatic portion is slightly longer than the membranous, being from one to one and a quarter inch in length; its caliber approximates 33 French at the vesical end or base of the prostate, 45 French at its middle and 30 French at its junction with the membranous urethra, or apex of the prostate. In passing, it may be mentioned that the length of this portion of the urinary canal is of the highest importance in prostatic troubles, notably in the senile hypertrophy of that organ. By the increase in its length we are often enabled to estimate the amount of intraurethral impingement of the gland.

Urethral Glands and Crypts.—The glands and follicles of the urethra are of the highest importance. On its upper wall are a number of mucous follicles or glands,—the glands of Littre; associated with them are a smaller number of pockets or reduplications of the mucous membrane, which are known as the crypts, or lacunae, of Morgagni. The largest of these, the lacuna magna, is the most constant and lies about three-quarters of an inch back of the meatus. The ease with which these glands become infected and the corresponding difficulty of ridding them of their inflammatory contents, make them highly important in the consideration of male gonorrhea.

Brief mention also should be made of Cowper's glands, situated one on each side of the membranous urethra and lying in the substance of the compressor urethrae muscle. These glands secrete a mucous fluid during the sexual orgasm, which is passed through a duct to the bulbous portion of the urethra.

They are sometimes attacked by the gonococcal infection and not infrequently require surgical interference.

The Genital Tract.—The genital tract is of far greater importance than the urethral canal in the ultimate results of its infection by the gonococcus, owing to the difficulty of “getting at” the seat of infection and the consequent tendency to chronicity. It will be seen (Fig. 1) that any acute inflammation involving the prostate passes rapidly to the seminal vesicles and less frequently, to the epididymes. It is apparent, therefore, that if we can succeed in limiting the in-

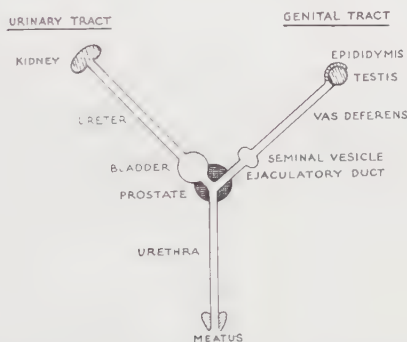


Fig. 1.—Author's schematic representation of the male urogenital tract.

fection to the anterior urethra, or even to the superficial portions of the prostate, we can avoid the most serious complications of the disease.

The Prostate.—This glandulomuscular organ usually is described as resembling a horse chestnut, lying between the rectum and symphysis pubis and connecting the membranous urethra with the bladder. Its function is quite uncertain, but recent studies demonstrate that its secretion is essential to the life and activity of the spermatozoa after they have left the testes. From apex to base it is tunneled by the urethra, which passes between its lobes and broadens at the prostatic base to empty into the bladder. The muscular fibers of the prostate completely encircle this portion of the urinary tract and by

their tonic action help to keep the canal firmly closed. The finger in the rectum usually will identify the deep depression or groove which separates the lateral lobes and forms the roof of the prostatic urethra. The floor contains numerous important structures, principally the verumontanum or colliculus, a structure of erectile tissue, richly supplied with nerves and thought to be the seat of pleasure in the sexual act. On either side are the numerous openings of the prostatic ducts; anteriorly, the openings of the two common ejaculatory ducts and on its summit, the sinus pocularis or homolog of the uterus. Altogether the structure of the prostatic urethra offers the richest possible soil for the growth and permanent lodgment of the gonococcus and other bacteria.

The Seminal Vesicles.—The seminal vesicles are two conical pouches, connected with the vasa deferentia, lying on each side of the bladder and rectum. They serve not only as seminal reservoirs, but also activate the semen and expel it into the prostatic sinus immediately before the ejaculatory orgasm. Each vesicle actually is a single canal between 10 and 15 cm. in length, with diverticula, which double back on themselves, the whole forming an irregular pouch-like body. It is about 50 mm. long, 18 mm. wide and 10 mm. in thickness. When inflamed, these dimensions are considerably increased and the organs are easily palpable by the finger in the rectum. In the normal state they usually cannot be palpated. Within the prostate, each vesicle joins with its corresponding vas deferens to form the common ejaculatory duct, one on each side. It is through the vasa deferentia that the spermatozoa are transported from the testes to the seminal vesicles for storage and expelled into the prostatic urethra through the ejaculatory ducts during the sexual orgasm or nocturnal seminal emission.

Testes, Epididymes and Vasa Deferentia.—The vas deferens, leaving the common ejaculatory duct, joins the spermatic and cremasteric arteries, the artery of the vas, the

pampiniform plexus of veins and a rich supply of nerves, to form the spermatic cord, reaching the testes by way of the epididymes. Each vas is approximately twenty-two inches in length. The epididymis is a crescent-shaped body fitting around the upper and posterior surface of the testis and is divided into a head (*globus major*), body and tail (*globus minor*). When the gonococcal infection is of a severe type, the vas and epididymis frequently are attacked and sometimes the testis proper also is involved.

CHAPTER III

ACUTE GONOCOCCAL URETHRITIS: ACUTE GONORRHEA

Etiology.—It is universally agreed that the gonococcus (Neisser) is the causative factor in the production of gonorrhea (gonococcal urethritis). While it is true that the so-called nonspecific or simple urethritis may be caused by irritating discharges, menstrual fluid, excessive coitus, irritating chemicals and like causes, it is equally certain that true gonorrhea requires the presence of the gonococcus as the exciting cause. Gonorrhea can be acquired only through actual contact with an already existing gonococcal infection, whether the coccus can be isolated or not. This may be accepted as a law, in spite of those frequent instances in which a true gonococcus infection has followed coitus with a woman in whom the most careful examination reveals neither gonococci nor clinical evidence of gonococcal infection. These instances emphasize two important facts, which it is highly important to remember: First, the absence of a discharge or the failure to find gonococci in the genital secretions in women does not exclude the possible presence of a latent gonorrhea. If in such cases, a glycerin tampon is inserted in the vagina and retained two or three days, typical gonococci may be found microscopically upon the mucus which has collected about the tampon. Second, gonococci may be latent in the male genito-urinary tract for years without showing signs of their presence, until awakened by some extraneous exciting cause. In other words, gonorrhea in the male may be the result of infection from a woman in whom there are no evidences of the disease, or it may be the result of an autoinfection caused by latent gonococci hidden somewhere in his own genital tract.

Morphologically the gonococcus is difficult to isolate and identify positively, especially as against the micrococcus catarrhalis and the meningococcus. It is kidney or bean shaped, rather large in size (0.5 to 0.8 micron in length) and usually found in pairs, both contained within a capsule. Their characteristic attitude is with their concave or flat surfaces facing each other, a narrow slit intervening, which admits the passage of light. They multiply rapidly by transverse fission and thus we find them in groups of two and four and their multiples. The anilin dyes stain them readily. They usually are found embedded within the leucocytes or pus cells and epithelia. If the cell wall ruptures, the gonococci may be found between the cells in pairs or in groups. (Plate I.) They do not grow on ordinary culture media, but thrive best on a mixture of serum with twice its quantity of agar. Either hydrocele fluid or blood serum may be used. Neisser preferred a mixture containing ascitic fluid one part, agar two parts and one per cent peptone. They grow best at a temperature between 30 and 38 degrees centigrade. If the temperature of the medium on which they grow is raised a few degrees, gonococci are quickly destroyed. They are instantly destroyed at a temperature of $+25^{\circ}$ C. (108° F.). This important fact has been utilized in the treatment of gonococcal infections by diathermy.

Outside the body the gonococcus does not thrive. In moist pus at 37 degrees C., it may remain virile for one or two days; but at ordinary room temperatures, especially when the medium has dried, dissolution occurs rapidly. In the body, particularly in the prostate and seminal vesicles, gonococci may remain latent, as already observed, for years after an acute invasion, without showing the least evidence of their presence, only to reawaken and set up an acute inflammation as a result of some exciting cause, notably sexual or alcoholic excess. One pair of gonococci remaining vital in the tissues, have the potentiality of inciting a new inflammation. Bearing this latency in mind, we can explain those provoking cases

in which post-nuptial coitus with a virgin rapidly is followed by an acute outbreak of gonorrhea in the male, with typical gonococci present in the discharge.

By the same token, we explain those cases in which the patient says he has had gonorrhea numerous times within a comparatively few years; these repeated "attacks" are merely recurrences of an old, uncured infection, autoinfections stirred up by some exciting factor in the sexual life of the patient. These patients exhibit alternate periods of latency and recurrence; the latent periods may last a year or more, the patient regarding himself as perfectly cured of his first infection. This tendency to recurrence based on latency has led to the Viennese aphorism that "every attack of gonorrhea is curable except the first."

It is a curious but explainable fact that a long forgotten gonococcal infection may be revived and an acute inflammation develop as the result of an injury, inflammation or a surgical operation in some distant part of the body.

The adult male urethra is far more sensitive to gonococcal invasion than the adult vagina. In the female the most vulnerable parts are the urethra, cervix uteri and the glands of Bartholini. In female children, however, the inflammation is apt to take the form of a vaginitis rather than a urethritis, the vaginal mucosa being much more easily infected than in the adult. In male children, the urethral mucosa is highly sensitive to attack and the inflammation is likely to be of a much more virulent type than in the adult, because of the narrowness of the canal and the smallness of the meatus, both of which impede drainage, and because of the greater sensitiveness and lesser resisting power offered by the mucous membrane.

Staining and Examining the Gonococcus.—The technic of mounting and staining urethral discharges suspected of harboring gonococci is deserving of some attention in view of the careless and unscientific methods that often are employed in



Fig. 1.—Intracellular and extracellular gonococci stained with methylene blue. (Morton.)



Fig. 2.—Intracellular and extracellular gonococci stained with Gram stain. (Morton.)

practice. The primary requirement in any case is that the discharge be spread over the glass slide as thinly as possible, so that not more than one layer of cells will be seen on examination. In such a specimen, the individual cells can be seen and their relation to the other cells and to such bacteria as may be present studied. When the discharge is smeared on thick, the value of the smear for diagnostic purposes is minimized in direct proportion to the thickness of the cell layers. In chronic gonorrhea in the absence of a discharge, it sometimes is necessary to examine the urine for the presence of gonococci. This is a task equivalent to the classic search for a pin in a haystack and it must be admitted that they rarely are found in urine, except on culture. Whether or not this examination is made after a preliminary massage of the prostate and seminal vesicles (in chronic cases), the urine should be thoroughly centrifugated and the sediment thinly spread over the slide. Passing the slide lightly over a Bunsen flame, several times, fixes the specimen and it is ready for staining. When a discharge is present, the glans and meatus are thoroughly cleansed, a sterilized platinum loop is inserted carefully into the fossa navicularis and the drop is transferred to the clean slide. If a foreskin is present, care should be exercised to the end that the discharge to be examined actually has been taken from the urinary meatus and not from the preputial cavity.

The drop of discharge having been spread on the slide, it is thinned out before drying by passing the flat edge of a clean cover-glass or a second slide over it to and fro several times. The specimen now is stained and examined. Emphasis should be placed on the fact that failure to find gonococci in any given specimen is not necessarily to be construed as indicating the absence of gonococci in the urethral discharge. It means that they have not been discovered in that particular specimen. They may be found in goodly numbers in a second or third specimen. The repeated failure to find gonococci after careful search, however, may be accepted as presump-

tive evidence that they are not present in the discharge, but even that is not absolute proof.

In an undoubted clinical case of gonorrhea, where rapid results are desired, the simplest staining method is to apply a few drops of a dilute solution of methylene blue for a few minutes, wash off the excess in running water, dry with white blotting paper and examine with the $\frac{1}{12}$ oil immersion lens. When the classic symptoms of acute gonorrhea are present, diplococci observed by this method may, with a reasonable degree of certainty be accepted as the causative factor of the infection. When, however, the diplococci observed are not typically Neisserian, in all respects, the Gram stain should be used. It should be employed invariably in chronic cases and in doubtful cases because other bacteria might be mistaken for the gonococcus. In all cases, however, a culture is the most reliable and dependable.

Gram Stain.—The gonococcus is designated “gram-negative.” Briefly this means that when a smear is stained with the Gram method and decolorized by alcohol, the gonococcus does not take the Gram stain; in other words, it is *negative* to this stain. Other bacteria likely to be mistaken for the gonococcus because of their morphology, differ from the gonococcus by accepting this stain and therefore are termed “gram-positive.”

In the absence of a culture, this method may be accepted as diagnostic. The stain is thus applied.

(a) Paltauf's solution of Grüber gentian violet is applied to the fixed specimen for three minutes; the slide is dried with blotting paper—not washed;

(b) Cover the specimen with Gram's solution (iodine 1 part, potassium iodide 1 part, distilled water 300 parts) for two minutes, and blot;

(c) Decolorize with 95 per cent alcohol for one-half minute; wash off excess of alcohol;

(d) Add counterstain—bismarck brown—for two minutes,

rinse in water, dry and examine. The gonococci will appear of a yellowish-brown color, while other bacteria will have a purplish-blue color.

“The usual methods of preparing the aniline-gentian violet stain for use in the Gram method of staining bacteria require freshly prepared mixtures, owing to the instability of the stain so made. Sterling has introduced, however, a formula for such a stain that has proved very reliable and satisfactory and has the advantage that it will remain permanent for three or four months. The formula is: gentian violet, 5 gm.; alcohol, 95 per cent, 10 c.c.; aniline, 2 c.c.; distilled water, 88 c.c. The aniline and the alcohol are thoroughly mixed by shaking, and the water is added. Now the gentian violet is ground in a mortar, and the aniline solution added slowly until the stain is practically dissolved. The solution is filtered into a staining bottle.

“Instead of using this stain, one may substitute with satisfactory results a 0.5 per cent aqueous solution of methyl violet 6 B, which is very permanent and has been advocated by many workers for use in the Gram method of staining. When the latter solution is used, it is advisable to use a somewhat stronger iodine solution in the second step of the staining process than is used with the gentian violet solution. The formula for this iodine solution is: iodine, 1 gm.; potassium iodide, 2 gm.; distilled water, 100 c.c.”—(Jour. Am. Med. Assn.)

Other staining methods have been devised, but the Gram is the simplest and most reliable. It is well to remember, in passing, that any method of staining bacteria is open to the objection that it is uncertain and liable to error and that the only certain method of germ identification at our command, is to make a culture. For general work, however, in the presence of corroborative clinical evidence, it is quite proper and as reliable and definitive in the isolation and detection of the gonococcus.

CHAPTER IV

ACUTE GONORRHEA

Acute Anterior Urethritis (Gonococcal)

Pathology.—There is still some uncertainty as to which portion of the anterior urethra is first attacked by the disease. By most observers, it is believed that the gonococci coming into contact with the mucous membrane of the urethral orifice find lodgment at the meatus and there set up the inflammation. Others maintain that the urethra in its efforts to empty itself of the semen during the sexual orgasm necessarily creates a vacuum, as a result of which the infectious vaginal secretion is sucked, as it were, into the canal; according to these observers, the initial site of the gonococcal invasion may be anywhere in the course of the anterior urethra, but preferably and most frequently at the posterior portion of the fossa navicularis. This question, apart from its academic interest, also bears an interesting relationship to the subject of individual prophylaxis against gonorrhea.

If the gonococci invariably begin their attack near the meatus, it would appear safe to apply the prophylactic medium only to the fossa navicularis; the rest of the canal need not be protected. On the other hand, if any part of the anterior urethra is liable to primary attack, it would seem that nothing short of an injection filling the entire anterior canal would be of any real value as a preventive measure. However, the fact that the prophylactics in general use, particularly since the World War, are applied only to the fossa and are generally successful, tends to support the view that the primary gonococcal invasion involves the region immediately behind the urinary meatus and gradually extends backward along the urethra.*

*In this connection it is interesting to note that the primary lesion of syphilis may be found in the urethra three or even four inches back of the urinary meatus. This would seem to favor the "aspiration" method of infection, at least in syphilis.

Having gained access to the urethra, the gonococcus being a mucous membrane parasite, takes root, so to speak, and begins to grow and multiply like seed in the soil. On this rate of growth, influenced as it is, by the variability in the virulence and number of the invading hosts and the resistance they encounter, depends the duration of the period of incubation, or "hatching" period. Broadly speaking, in virginal gonococcal infections, the average period of incubation is from four to six days, though undoubted cases have been seen with incubation periods as short as twenty-four hours and as long as two weeks. This suggests the axiom that the more virulent and numerous the invading medium and the less resistant the urethral defense, the shorter will be the period of incubation and the more severe the inflammation.

During the incubation period, pathologic changes are going on progressively in the urethra, usually unnoticed by the patient. Soon after their lodgment in the canal, the gonococci invade the urethra in two directions. First, they attack the mucous membrane, advancing posteriorly toward the bladder, causing the mucosa to become hyperemic and swollen and narrowing the lumen of the canal proportionately. They next penetrate between the swollen epithelia into the subepithelial tissue, and chemotaxis follows. This is made evident by an exudation into the canal of white blood cells and serum, which constitutes the classic discharge of pus visible at the urinary meatus. The pus cells force their way into the canal through the interepithelial cement substance even to the extent of destroying the epithelia proper. The round pus cells penetrate deeper and deeper, so that a polymorphonuclear infiltrate is formed beneath the surface of the mucous membrane down to the subepithelial tissue; at the same time, the superficial glands, the crypts of Morgagni and the glands of Littre are similarly involved. The process thus travels backward along the urethra as well as into the deeper tissues; how far backward, depends upon the virulence of the invading organisms

and the tissue resistance which they encounter. The cut-off muscle is no barrier to the advance of the gonococci, though it does obstruct the passage of fluids to the posterior urethra.

It is thought by many observers that the entire tract down to the vesical neck is involved in every instance, even in the so-called anterior cases. This view seems to be borne out, in a measure, by the presence of a low grade prostatic involvement in cases which are limited clinically to the anterior urethra. Such cases show no clinical signs of posterior urethritis; nevertheless, appropriate diagnostic tests often reveal the presence of a mild, low grade chronic prostatitis. On the other hand, there is reason for believing that the chronic prostatitis observed in these cases is coincidental with, and not the result of, the specific infection in the anterior urethra.* Ordinarily the distal two or three inches of the pendulous urethra are most severely attacked, while the bulb is but moderately involved. In severe cases, however, the inflammation extends beyond the triangular ligament to the membranous and prostatic portions of the urethra, invading the prostate and seminal vesicles; it even may assume the character of a true urethrocystitis.

After the first few days, in a typical case, the inflammatory reaction continues to increase in intensity unless subdued by appropriate treatment, for ten days or two weeks, then remains stationary two or three weeks and at the fourth or fifth week, enters the stage of decline. By this time, a mixed infection with other organisms has developed; usually staphylococcus, *Bacillus coli*, diphtheroid bacillus and less often, streptococcus, may be found. These organisms often remain long after the gonococci have disappeared and may be the causative factor in the tendency to chronicity. Simultaneously with the development of these secondary infections, the dam-

*It has been shown that this type of nonvenereal prostatitis often may be found at the incipency of an acute gonococcal infection in young men who never before suffered from gonorrhea.

See Wolbarst: New York Med. Jour. and Rec., Jan. 6, 1926, p. 3.

Wohlstein: Dermatol. Wchnschr., February 14, 1925, p. 256.

aged epithelium is being replaced by new cells of the flat, horny variety and the entire damaged mucous membrane becomes more or less sclerosed. Gonococci remaining undisturbed in the epithelium find themselves safely intrenched and impervious to any therapeutic attack that might be made on them. This is the key to the situation as regards ultimate cure.

The urethral glands also undergo radical changes of the highest importance. Their secreting surfaces may become lined with nonsecreting horny epithelia; their ducts may become plugged with cell detritus and cystic suppuration may develop, or they may atrophy as a result of the cell infiltration of the periglandular structures. Within these ducts gonococci may become embedded and the protection which they thus acquire enables them to resist therapeutic attack, whether chemical or mechanical in character. The inevitable result is that these ducts are converted into minute pus pockets containing virile gonococci and other organisms which it is extremely difficult to eradicate or destroy. They frequently are the responsible factors in the recurrences of latent gonorrhea. Changes of a similar nature, though of more far-reaching consequences, occur when the prostatic glands and ducts are affected. These changes will be discussed later.

When healing has begun to take place, it is characterized by a new growth of epithelium which covers the raw spaces and erosions in the old mucosa. Being impervious to penetration by the gonococci, these new cells act as a defensive barrier against further invasion by such organisms as may have survived in the urethra or its many glands. Reinfection occurs in the subacute or chronic stages, because of a renewed attack by the remaining gonococci on the damaged epithelia which have not undergone regeneration. The importance of this reparative process, therefore, is readily appreciated. It teaches us, above everything else, that while it is a *sine qua non* that the gonococci be destroyed, it is of far greater im-

portance to secure a healed mucous membrane free from erosions and tears,—one that will act as a true barrier against possible reinfection.

Symptoms.—In a typical case of acute gonorrhea we can easily distinguish three stages or periods, —the advancing, stationary and declining stages.

1. *Advancing Stage.*—Within two to six or seven days after exposure, the first symptoms usually present themselves. Most patients complain of a tickling or irritating sensation in the urethra near the meatus, accompanied by a slight burning or smarting on micturition. The meatus quickly assumes a reddish color and between its slightly swollen lips may be seen a bluish mucoid discharge. These symptoms increase quantitatively and qualitatively. Within a few days, or even in less time, the simple sticky wetness between the lips has become mucopurulent and soon appears as a full-fledged purulent discharge. The lips have become red and swollen and have assumed their typical “angry” or pouting appearance; the pain on urination has increased and so has the tenderness and smarting in the canal. Inguinal glands are enlarged and tender, though they rarely, if ever, go to suppuration. In short, there is every evidence of an acute inflammatory process.

By the end of the first week, the inflammation has spread backward, at least as far as the triangular ligament. It should be the aim of good treatment to prevent the extension of the inflammation beyond this point. If this desirable end has been attained, the clinical symptoms gradually recede in intensity, the discharge diminishes, the gonococci diminish in number and finally disappear from the discharge; within four to six weeks, sometimes longer, there is no longer any trace of the inflammation and the patient is cured. This is the typical picture presented by an infection which has been confined to the anterior urethra and runs its course smoothly.

Acute Posterior Urethritis (Gonococcal)

When the inflammation has extended beyond the triangular ligament into the posterior urethra, it takes on a far more serious character than an inflammation confined to the anterior urethra.

Symptoms.—In mild cases, the inflammation is not accompanied by any particular symptoms, except perhaps a slight increase in the frequency of urination and an occasional painful erection. When, however, the posterior urethra is acutely involved, it makes the fact known by an unmistakable complex of symptoms. The most common of these is the increased frequency of urination and the increased pain which accompanies the act, especially at night. The patient urinates every hour or two, or even more frequently, each act being accompanied by more or less strangury. In severe cases, the last drops voided may be blood-stained. Pain is greatest at the end of the urinary act and may last some time. Erections are more frequent, sometimes almost continuous and often exquisitely painful. This condition is known as “chordee.” The discharge at the meatus may be stationary or even diminished in quantity. There is, however, an invisible but actual discharge of pus from the urethra into the bladder.* The patient may be feverish and looks sick. All of these symptoms may develop within the first week, but usually they reach their maximum intensity by the end of the second or third week.

To be sure, these symptoms are not equally severe in all cases. In some, the subjective symptom of pain and smarting is out of all proportion to the visible evidence of the disease; conversely, some patients will present a profuse discharge, very cloudy urine and an angry looking meatus, without complaining of any more pain than a slight tingling in the urethra. It is worthy of note, however, that a small meatus predisposes to a severe inflammation, probably because it acts

*This can be verified by one of the irrigation tests (see page 48).

as a dam and thereby causes a retention of the inflammatory products. In all cases, the personal equation enters largely into the question of symptoms: The neurotic has considerable pain and suffering; the phlegmatic has a discharge and nothing more.

Second or Stationary Stage.—For about two additional weeks, in the usual course of the disease, the symptoms remain about the same, unless complications have developed, in which event there are new symptoms, superimposed on the old. In fact, it is during this stationary period that most complications usually develop. Any cause that will tend to intensify the already existing inflammation, while it is at its maximum height, predisposes to the development of complications, the most common of which are acute prostatitis and vesiculitis, trigonitis, epididymitis and arthritis.

Third or Declining Stage.—By the end of the fourth or fifth week or thereabouts, in the average case, we notice a distinct change for the better. The pain is diminished, urination is less frequent and far less painful and so are the erections. The swelling of the meatus and its redness are considerably diminished; the discharge is now mucopurulent or entirely mucoid; if the urine be passed into a glass it appears much less turbid than before. If the disease continues to improve, this decline of the inflammation continues unabated; after seven or eight weeks every symptom has disappeared, the urine is sparkling and the patient is well.

Unfortunately this happy ending is not the rule, even under the best treatment. Very often the pain disappears, the urinary frequency is reduced to normal, erections are no longer frequent or painful, but the fact remains that there is an inflammation somewhere in the urogenital tract; the urine is not entirely clear and there is a discharge, more or less slight, at the meatus, especially on arising in the morning. This condition may continue indefinitely; we then have to deal with a chronic gonorrhea.

Factors which tend to prolong the duration of the inflammation may be the following: general debility, especially when associated with syphilis or tuberculosis, irritating or too much local treatment, unrecognized stricture resulting from previous infections, pinpoint meatus, insufficient rest, ingestion of alcohol, sexual excitement or indulgence, complications and autoinfections from glands and follicles, the prostate and seminal vesicles acting as focal points. In virgin cases the most important and frequent of these factors is *overtreatment*, this implying an insufficient appreciation and utilization of the reparative forces of nature.

CHAPTER V

DIAGNOSIS

The ease with which a correct diagnosis of gonorrhea can be made is in inverse proportion to the duration of the disease. The longer the infection has lasted, the more difficult it is, for obvious reasons, to make a correct diagnosis of the existing pathologic conditions. In the average run of acute cases, there is little or no difficulty. In point of fact, the objective symptoms are more than sufficient for all practical purposes and there is no need of asking a single question of the patient. The clinical symptoms speak more eloquently than any patient's words. When the meatus is red, swollen and edematous, in other words, when it looks "angry" or pouting and associated with it is a purulent discharge and painful micturition, the diagnosis of acute gonorrhea may be made almost to a certainty. This clinical picture cannot be mistaken for anything else. To confirm the diagnosis, one *always* should make a smear and examine the discharge for the Neisser gonococcus. The simple methylene blue or gentian violet stain is sufficient for every purpose in such a typical case. If, with this typical picture, we find diplococci in and between the pus cells, we may with perfect safety credit them with being the specific gonococci; should there be any doubt, however, it is imperative that the Gram stain be employed. One rarely encounters any reason for doubting the gonococcal nature of the infection when the classic triad,— "angry" meatus, purulent discharge and painful micturition, is present.

Differential Diagnosis in Acute Gonorrhea

When, however, the clinical picture is not so clear cut, the question of differential diagnosis assumes major importance,

for there are a number of conditions which often are mistaken for acute gonorrhea, sometimes with disastrous results.

1. Balanitis: Balanoposthitis.—This condition often is present when the patient has a tight foreskin and a more or less marked phimosis. A foul-smelling discharge issues from the preputial orifice, but it is impossible to say whether its origin is within or without the urethra, without retracting the inflamed prepuce. If this cannot be done, the prepuce is rendered as clean as possible and a smear of the presenting discharge is made for microscopic examination. The preputial cavity (not the urethra) is irrigated with a warm antiseptic solution until the washings come clear. The patient now voids his urine into one or two glasses. If the trouble is intraurethral, the urine will be cloudy and filled with pus; if the urine thus voided is clear, the infection is extraurethral and not gonococcal in nature.

In the latter event, relief of the phimosis is the first step in making the exact diagnosis. If retraction is impossible, a dorsal slit or a complete circumcision is imperative. When this has been done, it will be possible to say just what kind of lesion exists within the preputial cavity and to treat it properly.

2. Simple or Nonspecific Urethritis. The nonspecific varieties of urethritis, that is, those which are not produced by the action of the *Neisser gonococcus*, usually are not difficult of diagnosis, if one constantly bears in mind the possibility of their presence. In this classification are included first, the aseptic cases, in which leucocytes, epithelial cells and mucus predominate; this type of inflammation is the result of contact with menstrual or leucorrhœal discharges, highly concentrated urine, stricture, excessive and unusual sexual excitement or indulgence (commonly spoken of as "strain"), instrumentation and irritating prophylactic injections. The second or bacterial type is produced by various organisms. Quite a respectable list of organisms has been isolated and

demonstrated in nonspecific urethritis. The most important are the staphylococcus, *Bacillus coli*, streptococcus, pneumococcus, micrococcus catarrhalis, meningococcus, various sarcinae, diphtheroid and diphtheria bacillus, tubercle bacillus, micrococcus fallax and micrococcus caeruleus albus. A third, but rather unusual type, may result from systemic infections, such as typhoid fever, parotitis, intermittent fever, rheumatism and gout. Chronic constipation with autointoxication may favor the entrance of organisms (particularly *Bacillus coli*) from the intestinal tract into the blood stream and the urine and thus set up an infection of the urethra.

Whether these exciting factors are capable of producing an inflammation in an otherwise healthy urethra is doubted by some; but there can be no doubt that when the constitutional resistance is poor, for one reason or another, any of these factors may bring about an inflammation in the urethra which must be differentiated from the gonococcal variety. I have noted, in this connection, when excessive sexual strain is ascribed by the patient as the cause of the inflammation, it often, if not always, will be found that the posterior urethra, as well as the anterior urethra, is involved. In other words, we have to deal primarily with a subacute congestion of the prostatic urethra and of the prostate itself.

In nonspecific urethritis of whatever origin, the period of incubation, when it can be determined, usually is of shorter duration than in the specific variety, and the disease is characterized throughout its entire course by less virulent symptoms than those of gonorrhea. There is a slight burning sensation on micturition, the meatus is but slightly reddened and rarely swollen, and a whitish secretion, in which gonococci cannot be isolated, can be squeezed from the urethra. This is in sharp contrast with the profuse, virulent looking secretion which is seen in the specific cases; in some instances, the discharge may be quite profuse, but never virulent in appearance. The course of the infection not only is milder in every respect, but the duration is considerably less than in true gon-

orrhea and the response to medication is greater. Copious intake of water and a bland urethral irrigation usually suffice to bring about a rapid cure. It is quite certain that many of the reports of rapid cures in gonorrhea actually, though unknowingly, are concerned with these simple, nonspecific varieties. There are exceptional cases, however, in which the symptoms and course of the disease so closely resemble the true gonococcal variety that the diagnosis can be made only after fruitless, repeated cultures. Occasionally these cases run an obstinate course, in spite of any and all treatment, but more likely because of it; the chronicity of these cases may lead to a condition of sexual neurasthenia of extremely obstinate character (see chapter XVI).

3. Intraurethral Chancroid is by no means so rare as some writers would have us believe. It is practically always confined to the lips of the meatus, though it may extend backward into the fossa navicularis. I have seen several instances of urethral chancreoid in which the patient was treated for gonorrhea, simply because there was an urethral discharge at the meatus, painful micturition, and cloudy urine when voided in a glass. In these cases the patient may offer a valuable diagnostic hint by complaining of pain at the meatus when the tip of the injecting syringe is brought into contact with it. In every case which presents a discharge at the meatus, it is important to examine the meatal lips carefully for the possible presence of a chancroidal ulcer.

4. Intraurethral Chancre, when present, usually is found at or near the meatus, though it may be located as far back as three or four inches. When at the meatus, the typical induration and generally thickened and eroded appearance make the diagnosis a matter of no great difficulty, but one always must be on guard lest its presence be overlooked. Very often the localized induration in the urethra or at the meatus is observed first by the patient himself, particularly when it is situated some distance back of the meatus.

5. Syphilis of the Urethra. In addition to the primary lesion, the urethra may be the seat of syphilis as one of the manifestations of the secondary stage; also in the form of gumma. Both of these conditions rarely are seen, possibly because of the inherent difficulty in making this diagnosis. An exanthem of the urethral mucosa is just as possible and probably as frequent as the same lesion on any other mucous membrane. When present it simulates the nonspecific form of urethritis. The diagnosis is made by exclusion, assisted by syphilitic manifestations elsewhere in the body.

Gummata of the urethra may be mistaken for folliculitis and periurethral abscess. Before breaking down, they appear in the form of hard, circumscribed nodes, but sooner or later they suppurate and form large-sized ulcers, which in turn may form fistulas. Here, too, the diagnosis is made by exclusion and by the presence of other syphilitic manifestations.

6. Herpetic Urethritis.—A form of urethritis, rarely encountered, is that produced by herpes of the urethra. Very few authentic cases have been reported. The diagnosis is made visually through the anterior urethroscope. It may be associated with herpes progenitalis; in that event, it usually disappears without special therapy, coincidentally with the disappearance of the genital herpes.

These respective types of urethral inflammation are to be thought of whenever a patient presents himself with symptoms which are not typical of acute gonorrhea. But it must be borne in mind at all times that any inflammation of the urethral mucosa which is made manifest by a flow of pus, necessarily is the result of some irritant acting on the mucous membrane. The nature and character of this irritant must be determined both by clinical and microscopic investigation. In the typical gonococcal infection, the symptoms are so clear cut and unmistakable that the microscope is used solely to *confirm* the clinical diagnosis; in the atypical cases, the microscope is all important, but the findings must be supported by the clinical evidence.

Methods of Examination in Urethral Infection.— Before the physical examination is made, a careful history should be taken. This is of the utmost importance, especially as regards the number and dates of previous infections, if any, their duration and complications. The genital history in the interval between attacks also is important. These data should

URETHRITIS (acute chronic)		No.	Date.....19
Name.....		Address.....	Age..... (Married Single)
Duration.....		Number of Attack.....	Treatment (?).....
Previous Attacks (Date Duration)		1st.....	2d.....3d.....4th.....
Discharge { Profuse Moderate Slight None Morning drop		IRRIGATION TEST	
Urine { 1 cl.....		1.....	3.....
		2 cl.....	2 (Control).....4 M. U.....
Prostate.....		Vesicles.....	Stricture?.....
Meatus.....		Testes.....	Joint lesions?.....
Gonococci?.....		Epididymitis.....	Other Complications.....
Chief Complaint.....			
<div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">Referred by Dr.</div> <div> <div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">CASE RECORD</div> <div> <div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">URINE</div> <div> <div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">Discharge</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">Date</div> </div> <div> <div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">1</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">2</div> </div> <div> <div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">Massage</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">General Condition</div> </div> <div> <div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">Treatment</div> </div> </div> </div> </div> </div> </div> </div></div></div></div>			

Fig. 2.—The author's history and record card.

be recorded accurately, preferably on a card specially designed for this purpose. I have used such a card for many years with much satisfaction (Fig. 2). It measures 6 x 7 inches and provides not only for the findings on the first examination, but for the entire course of the disease.

The history having been taken and recorded, the external genitals are examined, especially the epididymes, for traces of

previous inflammation. The meatus now is cleansed and a specimen of the discharge taken for microscopic examination on a sterile loop, as already described. The common practice of pressing the glass slide against the unclean meatus cannot be countenanced on any ground whatever. If it can be defended in a crowded clinic, it surely has not the slightest justification in private practice.

It is well to note the size of the external meatus. A pin-point opening or an hypospadias, presages trouble ahead. It means lack of proper drainage and increased inflammatory reaction, both of which favor the extension of the inflammation to the posterior urethra with the probable development of complications.

The presence of gonococci having been determined, the next step is to ascertain how far back the inflammation has extended. In acute cases of short duration, nothing is better for this purpose than the Thompson Two Glass Test.* The use of any intraurethral instrumentation for diagnostic purpose at this stage is to be avoided.

Two Glass Test.—The patient voids into two or three clean glasses or cylinders. About two ounces of urine should be passed into the first glass, as this amount is sufficient to cleanse the anterior urethra of its pus content. The remainder of the urine is voided into the second glass, or a third glass, if that is desired. In acute anterior urethritis, the urine voided in the first glass is cloudy, the second urine clear (Fig. 3); in anteroposterior urethritis, Glass 1 is cloudy, Glass 2, the same or less cloudy (Fig. 4); in acute urethrocystitis, Glass 1 is cloudy, Glass 2 less cloudy, Glass 3 very cloudy (Fig. 5).

In every case, the prostate should be gently palpated, not massaged, as a matter of routine. This is especially important in cases in which there is reason to believe there is a

*Thompson Test, devised by Sir Henry Thompson, in 1868.

coexistent low grade prostatic involvement (see footnote, page 34).

When the case has progressed for some time, or when there is reason to suspect that an acute infection has been super-

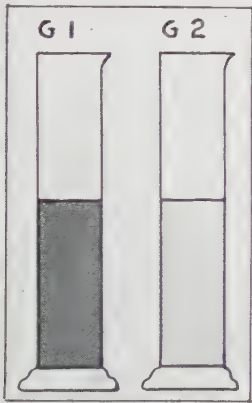


Fig. 3.—Acute anterior urethritis, two glass test.

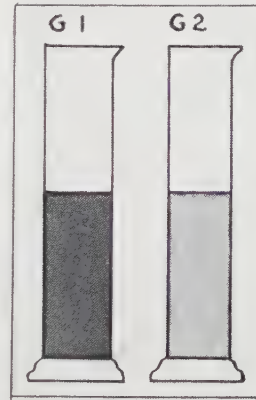


Fig. 4.—Acute anteroposterior urethritis, two glass test.

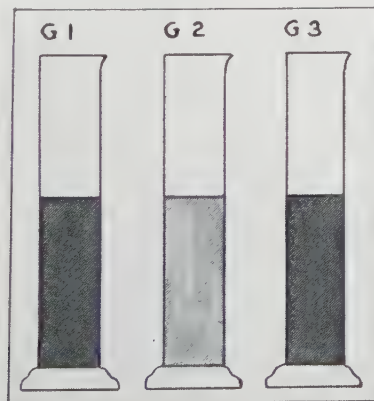


Fig. 5.—Acute urethrocystitis, two glass test.

imposed upon a chronic posterior urethritis or prostatitis of low grade, it will be found advantageous to determine the source of the pus in the urine by the employment of one of

the "irrigation tests."* The simplest of these and an extremely useful one in acute and subacute cases, is that known as Smith's **Irrigation Test**.† The patient presents himself

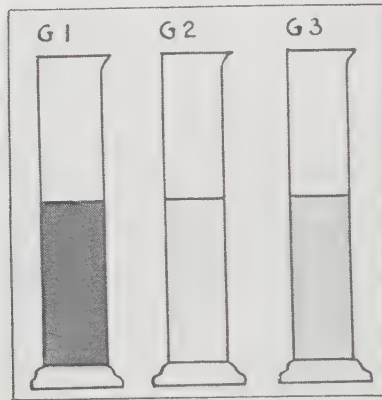


Fig. 6.—Acute anterior urethritis, irrigation test.

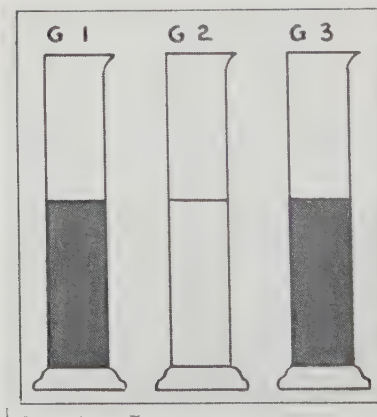


Fig. 7.—Acute anteroposterior urethritis, irrigation test.

with a full bladder. Before he urinates, a smear is made as a routine procedure and the anterior urethra thoroughly

*These tests are described in detail in the chapter on "Methods of Determining the Source of Pus and Shreds in the Urine," beginning on page 193.

†Ref. Lohnstein, Deutsch. med. Wchnschr., 1893, No. 44, p. 1072.

washed out with lukewarm sterile water, faintly colored with a drop or two of antiseptic dye solution. The urethra is irrigated until the washings come clear, into a second or control glass. This shows that the anterior portion of the canal has been rendered perfectly clean. The patient now voids urine into a third clean glass. If the urine thus voided is clear and sparkling, the inflammation evidently is limited to the anterior urethra (Fig. 6); if the urine is cloudy or turbid, the posterior urethra also is involved (Fig. 7). We are then dealing with an anteroposterior infection.

It is equally evident that if the washings from the anterior urethra into the first glass are perfectly clear, the anterior portion of the urethra is not affected; in that event, any shreds or pus found in Glass 3 necessarily must come from the posterior urethra or from the upper urinary tract.

It is my practice to employ this useful test in the following manner: The patient lies on a table with a large measuring glass or Wolbarst basin so placed as to catch all the washings from the urethra (Fig. 8). When three or four ounces of fluid have been used in irrigating, the washings are transferred into a clean cylinder, designated Glass 1. The measuring glass again is placed in position and the urethra thoroughly washed repeatedly, until the washings poured into a clean glass are clear and sparkling. This we call the control glass (G 2). The patient now passes his urine in a third clean glass (G 3), and the contents of G 1 and G 3 are carefully studied. I prefer to use a small glass syringe holding just enough to fill the anterior urethra. Goldenberg* and Jadassohn† recommend the use of a rubber catheter inserted back to the urethral bulb. The patient should be cautioned not to pass any of his urine while the urethra is being washed; furthermore, he should preferably have retained his urine for at least three or four hours. By this method of examination,

*Goldenberg: Med. Rec., Dec. 15, 1888, p. 700.

†Jadassohn, Verhandlungen der Deutsch. dermat. Gesellschaft, i, 1889, p. 172.

at the first visit, the gross fallacies of the two glass test will be avoided.

After the first examination, it is not necessary that this irrigation test be resorted to, except at occasional intervals, in order to judge the progress of the treatment. In the course of the treatment, the Thompson Two Glass Test, made at every visit, is ample for all purposes.

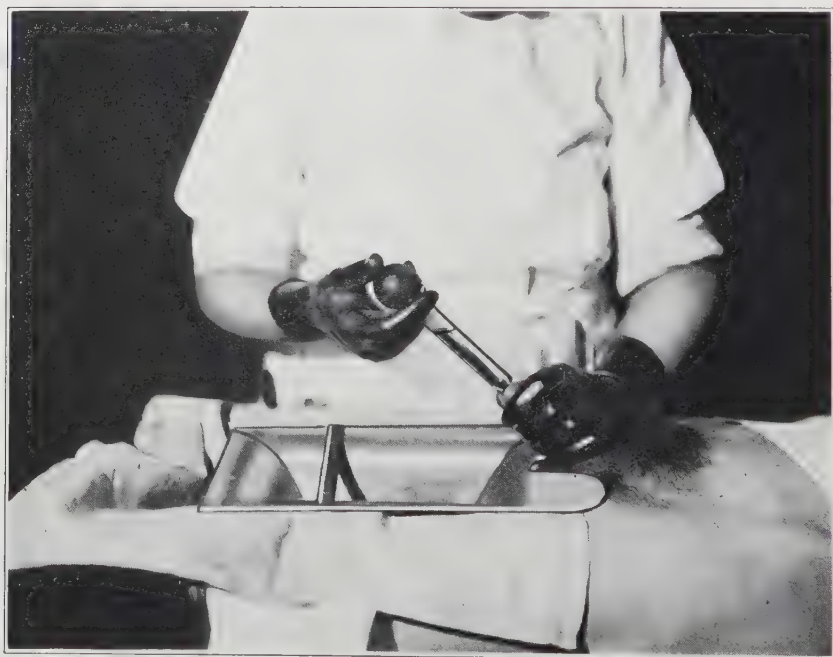


Fig. 8.—Irrigating the anterior urethra. Author's basin in position.

It goes without saying that the cloudiness in the urine may be due to other conditions than pus,—phosphates most commonly, urates, mucus and bacteria less often. If the discharge is considerable, the cloudiness of the urine is undoubtedly due to pus. If, however, the discharge is slight and we have our doubts as to the exact cause of the turbidity of the urine, the following simple tests should be resorted to:

(a) Heat some of the urine in a test tube for a few seconds; if the turbidity disappears, it was due to the presence of *urates*; if the turbidity increases or a precipitate forms, we have bacteria, pus, phosphates or mucus.

(b) Add a little acetic or nitric acid; if the turbidity disappears it was due to the presence of *phosphates*; if it is increased or precipitated, to pus or mucus, or both; if it remains unchanged, to bacteria.

(c) Add a little solution of potassium hydrate; if we get a gelatinous coagulum, the turbidity was due to *pus*.

(d) To determine the presence of bacteriuria, use the microscope.

Bearing these points in mind, it is apparent that the diagnosis of uncomplicated acute urethral inflammation can be made to a certainty by the objective symptoms alone. Add to these the symptoms complained of by the patient and we have a picture that should admit of not the slightest error or doubt in the diagnosis.

CHAPTER VI

TREATMENT OF ACUTE UNCOMPLICATED GONORRHEA

There can be no routine treatment applicable to all cases of male gonorrhea for obvious reasons. It is essential to determine whether or not the anterior urethra alone is affected and what complications, if any, exist; and we must appraise the virulence and extent of the infection by the evidence obtainable through a complete study of the case. All these factors should influence us in our choice of the therapeutic method to be pursued in treating the disease.

The great variety of methods and chemicals employed in the treatment of gonorrhea indicates clearly that we have not yet developed a generally accepted method of treatment. But vast progress has been made in this direction within the past decade; most satisfactory results will follow if we but take advantage of this progress and employ the newer methods properly.

Abortive Treatment

If we see the case very early, that is, within the first twenty-four hours after the first appearance of symptoms, we are justified in attempting the abortive method. At this early stage, while the gonococci are limited to the squamous epithelium of the fossa navicularis and before the development of much pus, it is still possible, in fact, comparatively easy, to abort the attack if suitable methods are employed. It is of prime importance that any method adopted should aim to destroy such bacteria as are present without injuring the mucous membrane. For many years, silver nitrate was the favorite means of aborting gonorrhea; but the method was so

painful and failed so often to abort the infection, that it is mentioned merely to condemn it. It never should be used.

Ballenger's sealing-in method has met with widespread approval as an abortive method. It is applicable only within the first twenty hours of the infection. Twenty to 25 minims of a 5 per cent solution of argyrol, reargon or lunosol are injected into the anterior urethra and the urinary meatus is thoroughly dried and sealed with noncontractile collodion. The medication is retained three to four hours, after which period the collodion is washed off with acetone and the patient is directed to drink a large quantity of water to flush the urethra. This application is made again in six hours in the same manner. On the second and third days the injection and sealing are continued, twice daily. If after this time there is no discharge and the urine is clear, provocative tests are made to prove the cure.

With the recent introduction of neoreargon, a silver glucoside, one of the newest silver salts, an excellent abortive method has been provided. Five c.c. of a solution of 5 per cent strength in distilled water are injected into the urethra by means of a blunt pointed bulb syringe, at frequent intervals, so that at least five injections are given the first twenty-four hours; the number of injections is then reduced to four and then to three per day and continued for one week. The injected solution is retained in the urethra at least fifteen minutes, preferably longer. It is reported that the gonococci usually disappear at the end of the first day by this method. European urologists have recommended this preparation very highly; I have found it extremely valuable in a number of cases in which I have employed it.

Ionization also has been employed as an abortive method, but it is a rather complicated procedure and not within the field of the average practitioner.

Irrigations by means of hydrostatic pressure (Janet method) very frequently abort an infection, if begun early

enough. Any of the silver salts, antiseptic dyes or permanganate of potassium may be used.

Systematic Treatment of Acute Gonorrhea

If the method selected for aborting the infection has not proved successful after a fair trial, or if the inflammation has existed beyond the twenty-four hours in which the abortive method is effective, we must resort to systematic treatment. Treatment must have two primary ideals in view, to eliminate the gonococci and any other organisms which may have lodged in the genital tract and to restore the mucosa to its normal state. Any method of treatment which does not accomplish these results is detrimental and should not be employed. It is not necessary to kill the gonococci outright; that would require the use of chemical agents which would injure or possibly destroy the mucous membrane of the urethra. It is sufficient for all purposes that the urethra be converted into a poor breeding place for the gonococcus; if that is accomplished, the organisms gradually will disappear, leaving the mucosa intact and undamaged. It is to be remembered that the gonococcus is an organism of low resistance and can be destroyed by almost any chemical substance having antiseptic properties; the difficulty lies in reaching the gonococcus and destroying it without damaging the urethra at the same time.

One fact cannot be emphasized too strongly: *The inflamed urethra is intolerant to irritant chemical products.*

The subject of treatment may be divided into three parts, hygienic, internal and local.

Hygienic regulation of the patient's daily life is absolutely necessary, if a cure is hoped for. This means that the patient should avoid unnecessary exertion, rest as much as possible, sit rather than stand whenever possible, ride rather than walk and avoid alcohol and spicy foods. The diet should be simple, with plenty of fluid, preferably plain water, be-

tween meals. It is a good rule to have the patient drink a glass of water every hour. The bowels should be kept open. The patient is to be instructed as to the contagiousness of the discharge, with special reference to the care of the eyes. All soiled dressings should be destroyed by burning, if possible; the hands should be carefully washed with soap and water after each handling of the parts. Of course, sexual excitement and indulgence are prohibited.

It is desirable to distribute to patients printed instructions the observance of which is essential to their well-being. I have found the following very useful in my clinics:

General Directions for Patients Suffering with Gonorrhea

Your disease is infectious. You therefore must be careful to carry out orders exactly, so that the danger to yourself may be as little as possible and the infection of others prevented.

Complications of a serious nature develop very easily during the course of this disease, particularly after sexual excitement or intercourse, or after drinking alcoholic liquors.

The absence of a profuse discharge does not mean that the infectious stage has passed. Even in the watery discharge or in the threads in the urine, the germs may live for a long time after all acute symptoms are gone, thus making it still possible to infect others. Therefore do not consider yourself cured until your doctor tells you so.

Should you for any reason be unable to come here for treatment, go to some reputable physician or dispensary, tell the doctor the nature of your illness and follow his instructions until he tells you that you are cured. Never consult quacks or doctors who advertise.

Do not resume sexual intercourse until the doctor gives his permission. If you inquire, he will tell you how to avoid infection in the future.

OBSERVE THESE RULES

After each handling of the parts, wash the hands well with soap and water and dry them on a clean towel. Keep this towel for your exclusive use, if possible. Preferably use paper towels and burn them when they have been used.

Do not touch or rub your eyes with your fingers; the danger of infecting them is very great and may lead to blindness.

Wash the diseased parts gently, morning and evening, with lukewarm water and soap, drying with a small piece of soft linen or gauze; burn the cloth after using. *Sleep alone. This is very important.*

Apply a dressing to protect your clothing from the discharge; wear one of these constantly.

Take at least one warm, full bath each week, just before going to bed. Wear the protective covering during the bath. After your bath, wash the tub thoroughly and dry it carefully.

Dress warmly; avoid draughts, exposure to cold or wet; avoid wet feet. Keep as quiet as your work allows. Keep the bowels open. Sleep as much as possible.

Avoid alcoholics. Drink plenty of plain water or milk. Weak coffee or tea in small quantity are not injurious. Avoid spices, such as pepper, mustard, paprika, cinnamon, nutmeg, vinegar, or foods containing them. Eat plain, light food.

Avoid the company of women; sexual excitement brings on complications.

Come for treatment regularly and carry out your home treatment carefully. When in doubt about anything, ask about it.

If a foreskin is present, the best dressing is a piece of gauze, about four inches square, with a hole cut in the center just large enough to admit the glans penis (Taylor's dressing). It is passed over the glans to the corona and the foreskin pulled down over it, thereby holding it in place. If there be no foreskin, or a very short one, the "gonorrhea bags" made of gauze are excellent for this purpose. A well-fitting suspensory bandage should be worn, especially by those doing hard work or who walk much. The penis never should be squeezed to bring forth a discharge, nor should pressure of any kind be made, either by tight clothing or dressings. If the inflammation is severe, the penis should be immersed several times a day in water as hot as can be borne. To this water may be added a little potassium permanganate or other mild antiseptic. In any event the organ should be bathed several times daily and the preputial cavity kept particularly clean to avoid irritation.

Internal Treatment aims to render the urine bland,—antiseptic if possible. Within the past decade many urinary antiseptics have been suggested in the hope that they might actually destroy the gonococci, or at least render the urethra an unsuitable breeding place, but they have not been successful, as a rule. Modified balsamics also have been used, but without much success. The tendency today is to rely on the familiar alkaline mixture, containing the alkaline salts of potassium or sodium. Thus:

R	Potassii citrat.,	
	Potassii bicarbonat.,	
	Potassii acetat.,	āā 3 iiss
	Sp. aeth. nitrosi,	3 iv
	Syr. simpl.,	3 i
	Aq. dest., q.s. ad.,	3 iv

M.

Sig.: One teaspoonful four times daily in water.

To the above may be added, a few drops of tincture of hyoseyamus or belladonna, for relief of tenesmus, if present.

In my experience, methylene blue, one grain, combined with boric acid, four grains, in capsule, constitutes a most valuable adjuvant to treatment. Without unduly exaggerating its merits, I believe it exerts a specific influence of great value in acute gonorrhea. Its sole disadvantage is found in the tell-tale blue stain which persists during and after its administration. Nevertheless, the results attained justify its use whenever possible.

In general, it may be said, that copious draughts of plain water constitute the most effective internal remedy in the acute stage. Lafayette mixture, santal oil and its derivatives never should be used in the acute stage; they are useful, however, in later stages of the infection.

Local treatment has for its purpose the actual destruction of the gonococci, or what is equally effective and less dangerous, starving them out, so to speak, by rendering the urethral canal unsuitable for their growth. In either event, the infection should be confined, if possible, to the anterior urethra and this is best accomplished by producing the minimum degree of irritation and reaction compatible with the destruction of the gonococci.

There is no short cut to success in the treatment of acute gonorrhea; avoid complications and do not worry about the time it takes to bring about a cure. The cure is the thing, not the time it takes to do it. Nature cannot be rushed with impunity. The urethra is not a test tube; it is part of a living organism, sensitive to the slightest trauma, whether it be in

the form of a bacterial invasion, a chemical agent, or an instrument forced in by the hand of a physician. The urethra will not tolerate violence; gentleness and patience are more important factors in the cure of gonorrhea than the most skillfully prepared chemical preparation. Medication should be the mildest possible consistent with effectiveness, not the strongest that the patient can stand. Anything put into the urethra acts like a foreign body,—the stronger the solution, the greater the trauma and the greater the reaction. The secret of success in acute gonorrhea is to allay the inflammation and increase the body resistance; nature will take care of the gonococci if that is done. But it is wise to keep a watchful eye on nature to be sure that her work is well done. Above all, it is to be remembered that any form of local treatment which causes pain or irritation is to be avoided.

Two distinct methods of local medication have stood the test of time. The first consists in irrigating the urethral canal under hydrostatic pressure,—the Janet method. The second consists of local applications of silver salts to the canal by means of a small glass syringe. The use of astringents in the acute stage properly has been abandoned.

The Janet irrigation method is not so popular as it was twenty years ago; it is quite probable that ultimately it will pass into oblivion, due to a better understanding of the merits of the silver salts and some of the newer antiseptic dyes. The purely cleansing value of hot antiseptic fluid in large quantity, flowing in and out of the inflamed urethra cannot be gainsaid, but the method is open to two serious objections. There is a possibility of irritation and trauma caused by the pressure of this volume of fluid against the inflamed mucosa and a danger of converting an uncomplicated anterior infection into a posterior, with its subsequent complications, by driving the infectious process into the deeper parts of the canal. Kohnstam and Cave,* of London, have demonstrated

*Kohnstam and Cave: *The Radiological Examination of the Male Urethra*, New York, 1925, William Wood & Co.

that fluid can be driven into the seminal vesicles by forced injection from the urinary meatus; and no less an authority than Sir John Thomson-Walker recognizes this fact as "a practical demonstration of the evil of applying high pressure in urethral irrigation." While these contingencies may be considered remote in the hands of an expert, it is well to remember that the general practitioner usually is the first to see the patient with an acute gonorrhea and he is not likely to be an expert in hydrostatic irrigations.

How many cases of epididymitis and prostatitis owe their being to the faulty use of irrigations none can say, but the number is very great. In the hands of the inexperienced or careless, this method is potentially dangerous. It is obvious that any stream of fluid which induces pressure against the walls of the urethra greater than that of the usual urinary stream, is a menace to the integrity of the urethral mucosa and possibly a cause of death. This is exemplified by a recent report* of a postmortem examination in Prague, on a man who had been irrigated with a 1:500 solution of potassium permanganate at a height of 1.65 meters (five feet) one hour previously. Microscopic examination of his anterior urethra showed splitting of the inflamed, friable mucous membrane in many places.

It is questionable, to say the least, whether such a method with its obvious dangers and risks should be used as a routine procedure, particularly since the same, if not better results, can be attained by a judicious administration of the silver salts. It cannot be denied, of course, that the hydrostatic irrigation is quite an impressive affair to the average patient, which cannot be said of the humble hand injection.

Those who practice the irrigations advocate its employment once or twice daily, copiously flushing the urethra under hydrostatic pressure. There is much truth in the widespread opinion that while these irrigations actually cut short the acute stage, they also tend to prolong the terminal stage, the

*U. S. Pub. Health Service (Ven. Dis. Inform'n), March, 1925.

result being a tendency to the development of a chronic catarrhal condition.

Another important point worth noting: The lacunae in the anterior half of the penile urethra open toward the meatus, while those in the distal half open toward the bladder. It is therefore difficult to imagine that these pus-filled lacunae, especially those opening posteriorly, can be medicated by irrigation of the urethra; it also would appear that the infected glands of Littré likewise are inaccessible to the irrigating fluid.

The favorite solution for hydrostatic irrigation is potassium permanganate, in a strength approximately 1:5000. Many substitutes have been recommended, with more or less success. Notable among these is mercurochrome-220 and acriflavine. The former has been used quite extensively but its routine use is objected to because of the deep red stain which it leaves on anything with which it comes in contact. Acriflavine likewise has been widely used both as a hand injection and as an irrigation, or both methods combined, but has not fulfilled early expectations.

It may be mentioned in passing that the irrigation treatment with any mild antiseptic solution stands unsurpassed in cases of nonspecific urethritis. A few daily irrigations usually suffice to bring about a cure in the average case.

In my judgment, the most successful and dependable method of treating acute gonorrhea, one which any practitioner can administer with safety and reasonable assurance of success, is the local use of the newer silver salts as a hand injection. The particular salt to be selected, depends upon one's judgment and experience. If it is well chosen and properly applied, a prompt response will make that fact evident; if the response is unfavorable, or nil, there is something amiss with the remedy or its application and a change is indicated. The most popular silver salts (in the United States) are argyrol, silvol and neosilvol, albargin, protargol and lunisol (white silver), the last being the latest American addition

to the list. It is a stainless preparation and possesses an increased silver content without being irritant. It has been used but a short time, but already has been warmly recommended.

Still more recently, reargon and neoreargon (made in Czechoslovakia) have been added to the list of silver salts and strongly approved by Max Joseph, Klausner, Wiechowski, Duhot and other European authorities. Extensive laboratory tests have demonstrated that this salt possesses a marked superiority over its predecessors in penetrating power, germicidal action and harmlessness to living tissue cells. It is maintained that reargon, not only exerts a destructive power over the gonococcus, but actually stimulates the leucocytes instead of attacking them, thereby encouraging their phagocytic action.

Clinically, numerous observers both in the United States and abroad (including myself) have found it valuable, especially in the very early stages of acute gonorrhea. Not only does it control the inflammation and rid the urethra of the gonococcus, but patients declare that it is absolutely nonirritating, even if retained in the urethra for half an hour. A slight sense of warmth occasionally is felt while the solution is in the urethra, but it is not uncomfortable.

Neoreargon has been produced as an improvement on the original preparation. It is said to contain two and one-half times as much silver as reargon, that is, 15 per cent silver and 63 per cent glucoside and is equally nonirritant, though its silver content is said to equal a 1.19 per cent silver nitrate solution. It has the additional advantage of being a definite chemical compound, not a colloid; it is for that reason, stable in solution. Neoreargon is dissolved in distilled water and used as a hand injection in strength varying from 2.5 per cent to 5 per cent. Not more than 5 c.c. of the solution should be injected at one time. It is injected with a blunt-pointed bulb syringe every three hours and retained in the urethra at least fifteen minutes, longer preferably. I have found it

advisable for the patient to inject himself before retiring and at least once during the night should he awake. For intravesical irrigation, in posterior cases, the strength of the solution is reduced to 0.25 per cent. I have seen striking results in cases treated with this preparation.

These silver salts are destructive to the gonococci in the urethra, according to their silver content; they act by producing an intense local hyperemia, inducing a profuse serous exudate and active phagocytosis which carries away both the living and dead organisms.

Local treatment should be instituted as soon as the diagnosis is made; the earlier the better. In favorable cases, the inflammation may be aborted in this way; in any event, more can be accomplished in the first seven days than in the next seven weeks.

Solutions should be made fresh every day or second day, using distilled water exclusively. A weak solution (3 per cent) in the beginning may give better results than a strong one. This is quite contrary to the usual practice, but the conclusion is based on my own experience.

Injection is made with a blunt-pointed glass bulb syringe with a capacity of two drams, the patient lying on a comfortable dressing table, the meatus closed by a meatal clamp made for the purpose. The urethra should not be distended with the fluid; there should be just enough to comfortably fill it. If neoreargon is employed, not more than 5 c.c. should be injected and retained fifteen to thirty minutes.

Under the use of these weak solutions the pain quickly ceases, the gonococci rapidly diminish in number, the discharge is kept under control and gradually disappears and extensions to the posterior urethra are reduced to a minimum. Gradually, but slowly, the strength of the solution is increased, the urine meanwhile being examined in two glasses every day to note the effect of the treatment. If the urine continues cloudy and full of pus, the strength of the solution is decreased; as the urine begins to clarify, the strength is

increased, on the theory that the more virulent the inflammatory reaction in the canal, the less powerful the remedy to be applied. I prefer to give the injections myself or have them given by a trained assistant. The patient is taught how to inject, only if additional treatment at home is deemed necessary; faulty injections generally induce extensions and complications.

The patient is instructed to sit well forward on the edge of a chair, the clothing suitably arranged to avoid contact with the fluid, in the event of its escape from the syringe or urethra. The penis is held between the thumb and forefinger of the left hand and the meatus gently opened. The tip of the syringe is gently but firmly inserted within the lips of the meatus, the thumb and forefinger of the left hand holding the lips tightly over the tip of the syringe, so that none of the solution can escape. The injection should be made slowly and continuously, without jerking or violent movements of the injecting hand. As soon as the patient begins to feel the urethra quite full, the injection should cease; the thumb and forefinger close the meatal lips tightly, while the tip of the syringe is slowly withdrawn. The solution is retained in this manner ten or fifteen minutes,—the longer the better.

Instead of giving the patient a prescription, it is preferable to give him sufficient freshly made solution to carry him over to the next visit. With a prescription nestling snugly in his wallet, the average man will “steal a beat” on his physician and simply renew the prescription whenever he has a fresh attack or a recurrence of the old one, very often to his own undoing.

At the end of the third or fourth week and sometimes much sooner, if the case has progressed successfully, the urine is clear with a few shreds, there is no pain or discomfort on voiding and possibly a slight watery discharge which may contain few or no gonococci.

It goes without saying that the discharge repeatedly is ex-

amined microscopically and that the treatment largely will depend on the findings. Persistence of the gonococci indicates that the treatment is not developing the maximum result. It is desirable to change the medication from time to time, especially if results are not satisfactory. There is good reason to believe that the bacterial organisms develop a form of immunity or "fastness" when attacked by the same chemical substance continually; it is likewise generally recognized that there are many strains of gonococci, some of which react to one chemical while others respond to another.

It is pointed out elsewhere that persistence of the gonococci in the discharge, after three or four weeks of treatment is highly suggestive of prostatic invasion; in such cases the prostate and seminal vesicles should be examined and carefully observed.

At this later stage of the infection, the balsamics are indicated. Santal oil and kava-kava, separately or combined, are useful. Some of the more elegant santal oil preparations are more easily borne and less irritant to the gastrointestinal tract. Among these the most popular are gonosan, santyl and arhéol. Their comparative expensiveness is their most serious drawback.

My personal preference is for gonosan, a combination of santal oil and kava-kava. Gonosan, in my experience, does not generally produce gastric or renal irritation and helps to control the secretion of pus by inhibiting bacterial growth. Moreover it has the important advantage of being less expensive than the other preparations named.

With the disappearance of the gonococci from the discharge or culture, astringents are substituted for the silver salts. Zinc sulphate ($1\frac{1}{2}$ per cent) or zinc sulphocarbolate (1 per cent) or bismuth subnitrate (10 per cent) apparently are equally effective. These are continued for two or three weeks, and we find, after the usual tests, a clear urine, a healthy mucosa and no gonococci.

In the average case, if seen early and treated by this

method, it is quite unusual for the infection to extend to the posterior urethra. Using this method, it will be observed that while the silver salt solution is being retained in the urethra, about one-third of the amount injected has slowly and imperceptibly entered the posterior urethra, drop by drop, and in this way has medicated that portion of the canal. It is highly probable that this acts as a prophylactic against the spread of the infection to the posterior urethra.

The urine having become clear, particularly the overnight urine, with a few or no fine shreds, and gonococci absent as determined by usual tests, it is well to dilate the urethra with a large sound or preferably with the Kollmann dilator under aseptic conditions, once or twice weekly for several weeks. The prostate also should be examined and gently massaged and the secretion examined microscopically, preferably by culture. Negative findings may be accepted, in these circumstances, as indicative of a cure. The determination of cure in complicated or chronic cases will be fully discussed on page 201.

Additional Methods of Treatment

Other methods of treatment of acute gonorrhea have been devised within the past few years, all of which have their ardent advocates. The most efficient will be discussed briefly:

Diathermy has been used with considerable success in acute gonorrhea and its complications, particularly by Corbus and O'Connor, in the United States and Cumberbatch and Robinson, in England. Treatment is based on the fact that the tissues are heated locally to 40°C ., which temperature is lethal to the gonococcus without being injurious to the tissue cells. It is claimed for this method that diathermy may destroy all gonococci in acute urethritis within twenty-four hours after the first treatment (110°F ., for thirty to forty minutes). The application of this method is fully described in the chapter on Diathermy, beginning on page 185.

Metaphen, a mercuric germicide, is said to be nonirritating to the mucosa, in solutions strong enough to be bactericidal. In acute gonorrhea, it is used in a 1:8000 solution and may be injected locally or used in the form of an irrigation. It has the advantage of being stainless. I have never used it.

Recent therapeutic progress has been made in the direction of utilizing the blood stream and the natural resistance of the body in the attack on the infectious process.

Vaccines.—The first of these indirect measures came with the employment of vaccines. Although it is generally recognized that vaccine therapy has its greatest field of usefulness in the presence of complications, I have found it desirable to employ this method in uncomplicated anterior or anteroposterior cases, especially in those which showed evidences of a virulent type of infection with diminished body resistance. Vaccines not only promote increased body resistance in the blood to attack the gonococcus and its toxins, but they also attack the bacterial organisms which have penetrated the glands and deeper layers of the mucosa and therefore are beyond the reach of medicating fluids. As a constitutional adjuvant to local therapy, vaccines are indispensable, particularly in cases in which there is a sluggish response to local measures. The most satisfactory vaccine is that which can be given in maximum dosage without producing toxic effects, which does not produce a violent reaction and which most quickly stimulates the production of the greatest amount of specific antibodies. I have found a mixed polyvalent vaccine (Mulford) most useful as a routine measure; autogenous vaccines have not been of any value in my experience.

Protein Therapy.—The same ends have been sought in the introduction of foreign protein therapy. Sterilized or boiled milk, typhoid vaccine, turpentine and other protein substances are injected intramuscularly or subcutaneously. The reaction is a biologic response of the body, the natural resistance of which is increased by these measures. This is shown by the increased leucocytosis which follows these injections.

Boiled or sterilized milk is most frequently used, especially in Germany. After being permitted to cool to room temperature, 5 c.c. are injected into each buttock, avoiding blood vessels. Pain is alleviated and the inflammatory process quickly subsides.

Turpentine also has been frequently used in the form of a 20 per cent emulsion in olive oil; 0.5 to 1 c.c. is injected in the buttocks every other day. These protein injections are especially efficacious in the complications of acute gonorrhea.

A combination treatment of milk and vaccine has been employed in Europe with striking results. Milk is injected into the buttocks as already described and an antistaphylococcal vaccine into the lower abdominal wall, in equal volume. It is maintained that the results of this treatment are far superior to those obtained by the standard measures. Exceptionally favorable results have followed its use in acute prostatitis and epididymitis.

Autoserotherapy has been highly recommended. It is said to exert a remarkably sedative action on the inflammation; in the presence of complications it quickly diminishes the pain and inflammation. The technic is quite simple: A few drops of blood are drawn off and incubated; of the resulting serum 0.5 to 1 c.c. is injected intramuscularly every few days.

Intravenous Therapy.—For the direct attack on the infectious process through the blood stream, intravenous therapy has attained considerable vogue, though its ultimate therapeutic status is far from certain. It appears that the injection of chemical substances into the blood acts somewhat like a protein injection and that the toxic effect on the bacteria is secondary and not direct. Dale, studying the chemotherapy of the new antiseptics thus employed, suggests the following possibilities of their method of action: That they do not kill the parasites immediately, but modify their virulence or lower their resistance to the body's natural defenses; that they form in the body some directly toxic products either by modifica-

tion of its structure or by its union with some tissue component; and that they have an affinity for certain cells of the host's body, leading to the formation of a depot from which the curative substance is relieved.

The most prominent of these substances is **Mercurochrome-220**. It was first used as a local irrigation with some measure of success. It has a marked penetrating power, which is made evident by its intense staining qualities. Mercurochrome has found its greatest field of usefulness in gonorrhea as an intravenous injection. It has been successfully used in about 60 per cent of acute infections and their complications, according to Young and his coworkers. Young regards the failures as having been due either to insufficient treatment or to the early development of reactions which prevented continuation of the treatment.

On the other hand, Braasch and Bumpus, reporting from the Mayo Clinic, believe that its toxicity is the greatest objection to its routine use intravenously. Severe reactions marked by prostration, chills and dysentery, were common in their experience. Two patients thus treated, died; on necropsy in one case, toxemia was considered the probable lethal factor in the absence of any other evident cause of death.

Those who advocate its use, do not recommend it as a substitute for the silver salts, but as an adjuvant to local treatment. They believe that mercurochrome given intravenously attacks and destroys the gonococcus in the tissues of the body, but the bacterial organisms on the surface of the urethra seem to escape its influence. To combat these surface organisms, the local use of the silver salts is necessary.

Mercurochrome is best given intravenously in a 1 per cent solution, at 48 hour intervals, the granular form being dissolved in warm, freshly distilled water. This drug is excreted in large quantities by the kidneys and also secreted through the prostate, seminal vesicles and other glands of the genital tract. It therefore comes in direct contact with the affected areas through the blood stream and the urine. Its eventual

place as a standard antigonococcal therapy still is undetermined, but there can be no doubt of its definite value in a certain proportion of cases. Recently, a method of treatment has been devised in which the action of a nonspecific protein and sugar solution has been employed to increase the efficiency of the mercurochrome. In a series of twenty-five cases treated by this method in the U. S. Navy, it was reported* that three injections were found to be sufficient in the average case to cause disappearance of the discharge and to clear the urine; patients with complications required one or two more injections to clear them up; the sick days ranged from six to ten days; the results obtained were extremely satisfactory.

Acriflavine intravenously also is strongly recommended, particularly in France where it was first used in this manner. Five mils of a 1:50 solution in distilled water are injected three times weekly and less frequently after that. Intra-urethral medication is considered unnecessary. It is said that excellent results have been attained through this method.

Herrold and Culvert† report that the local use of neutral acriflavine in gelatin has given results superior to any other method. There is a lower percentage of complications and in the uncomplicated cases there is a marked reduction in the duration of the disease. There is also evidence to show that there may be less late or subsequent gonorrheal pathologic changes with this method of treatment.

For internal medication, it is administered in the form of enteric coated tablets, in dosage of $\frac{1}{2}$ grain, three times daily. It is said to be particularly effective in posterior urethritis as an internal antiseptic and urinary sedative.

Numerous other preparations are being used, but space forbids mentioning all of them. There is a growing literature on the value of these methods of treatment in gonorrhea, but opinions are far from unanimous. It is quite possible that

*Williams and Cooper: U. S. Naval Medical Bulletin, April, 1927, p. 352.

†Jour. Am. Med. Assn., February 12, 1927.

future experience in the technical administration of these preparations and further improvement in their manufacture, may demonstrate more fully their value in acute gonococcal infection, but for the present their status must be considered undetermined. The silver salts still constitute our greatest weapon against the gonococcus.

McDonagh, of England, has devised a novel method of treatment, based on his original theory of oxidation and reduction, which has been highly praised by some and rejected by others, in England. He has kindly consented to write a chapter, giving his views on gonorrhea and its treatment; this begins on page 226.

Treatment of Acute Posterior Gonococcal Urethritis

It is possibly true that every case of acute anterior gonorrhea extends by contiguity to the posterior urethra; it certainly is true that a goodly number of acute infections give no symptoms or evidence of posterior involvement, either subjectively or objectively, at any time. These cases we are justified in designating as *anterior*; those, however, in which the process has manifestly extended to the deeper parts of the urethra and is making its presence apparent by "posterior" or "bladder" symptoms, we designate for clinical purposes as *posterior*. We are also justified in suspecting the presence of a low grade posterior infection when gonococci persist in the secretions for an undue length of time, even though they present no clinical symptoms pointing to posterior involvement.

Posterior gonococcal urethritis is the precursor of complications, the avoidance of which lies in treating the posterior infection in such a manner as to prevent further extension of the inflammation to other parts of the urogenital tract. It is therefore important to observe the usual hygienic rules as regards local cleanliness, abstinence from sexual and alcoholic stimulation, regulation of the diet and so forth. Violent exer-

aise is to be prohibited and the testes carefully supported to avoid sudden jarring.

Internal Treatment.—The internal treatment of uncomplicated posterior cases should not differ from that employed before the deeper parts became involved. Copious intake of water is the remedy par excellence. When the symptoms are well marked, the treatment is purely symptomatic. For the bladder irritability and tenesmus, the alkaline mixture already referred to is extremely useful; there is nothing better. For the painful erections, we generally employ camphor monobromate, 2 to 5 grains, in pill or emulsion; likewise, lupulin and the mixed bromides. The symptoms should be met as they arise in the individual case.

Hydrotherapy.—In addition to the forced intake of water, we have a valuable adjuvant in the local application of hot and cold water. Immersing the penis in hot water during micturition often diminishes the pain perceptibly; a hot penile bath before retiring often prevents the occurrence of painful erections (chordee). A hot sitz-bath several times daily, especially at bedtime, gives great relief particularly when the prostate is involved. The water should be as hot as can comfortably be borne, beginning with about 100° F., and adding hot water gradually. A hot rectal irrigation, with a recurrent flow tube, is very soothing and affords much relief, when given several times daily.

Local Treatment.—Many authors advocate a complete cessation of all local treatment as soon as there are visible signs of posterior involvement. This view certainly is justified in those cases in which it appears that the extension to the posterior urethra has been the result of "overtreatment." In such a case, when the treatment is suspended and the patient is given a mild urinary sedative, the vesical and prostatic symptoms almost instantly show signs of improvement. If we could properly interpret what we see and what the patient feels, we should regard his "posterior" symptoms as a protest

by nature against the excessive treatment to which he has been subjected.

When, however, there is no evidence of "overtreatment," it is my opinion that the posterior involvement does not necessarily demand the cessation of all treatment. To the contrary, most excellent results follow the proper use of local therapy in posterior gonorrhea.

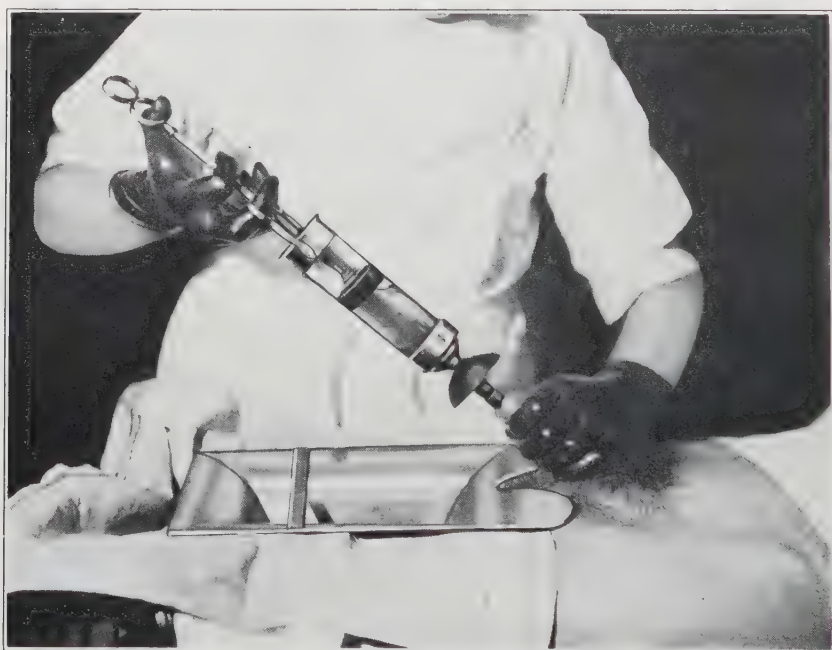


Fig. 9.—Irrigation with the Carleton syringe, showing the author's basin in position; Wheeler tip attached to syringe.

The most popular method, but not always the best, is the irrigation method, already described, except that the fluid is permitted to enter the bladder. These irrigations may be given in three ways: By hydrostatic pressure (Janet), by the large Carleton hand syringe and by means of a catheter. The object to be attained is the introduction of a large quantity of warm medicated fluid into the bladder, which is then

voided by the patient per urethram. When the Janet method and the Carleton syringe are used, the urethra is irrigated twice,—entering and returning; when the catheter is used, the urethra is irrigated but once, after the catheter has been withdrawn and the urine voided naturally.

My personal preference in intravesical urethral irrigation is the Carleton syringe (Fig. 9). This method has all the advantages of the hydrostatic irrigation without its risks. The syringe holds approximately six ounces. A Wheeler rubber tip and shield, easily attached to the syringe, fits snugly into the meatus and the rapidity of the flow, the amount of pressure applied and quantity of fluid injected, are absolutely

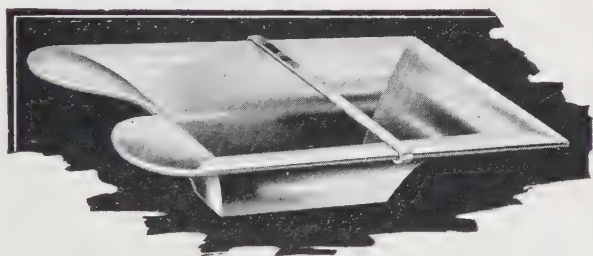


Fig. 10.—Genitourinary basin (Wolbarst).

under the control of the operator's hand. With the left hand holding the glans and the right hand introducing the fluid into the bladder, the slightest contraction and relaxation of the cut-off muscle instantly is appreciated and the pressure of the hand on the piston increased or diminished as the conditions demand.

For intravesical irrigations, any one of a number of excellent preparations may be selected. Potassium permanganate has been the standard since its introduction by Janet; more recently, the silver salts in varying strengths, collene, mercurochrome-220, acriflavine and other antiseptic dyes have acquired favor in the hands of urologists. In extremely stubborn cases, Janet recommends that oxycyanide of mercury in solution be substituted for the permanganate solution.

Generally speaking, the irrigation method (Janet) is effective in posterior infection; the results often are very striking. But one's faith in this method is sorely tried by the occurrence of complications, especially epididymitis, which not infrequently are due to the irrigation itself. This has been discussed at length on page 59. With the advantage of better control of the fluid afforded by the Carleton irrigating syringe, however, the risk of complications is greatly diminished. For that reason it should be used preferably whenever posterior irrigation is employed.

The catheter never should be used in acute urethral infections as the method of choice. In rare instances, however, when it is desired to flush the entire canal with hot fluid and irrigation is unavailable or impossible, the smallest calibered catheter may be employed with gentleness and caution.

The comfort of the patient and the efforts of the practitioner will be enhanced by the use of the genitourinary basin (Wolbarst).^{*} This basin is made of light sheet metal and is so shaped as to rest comfortably on the thighs of the patient (Figs. 8, 9, 10).

In my own practice, the irrigation treatment rarely is used. If the posterior urethra becomes involved, the silver salts are employed as before, with little if any change. The solutions are employed as in anterior urethritis (previously described). In the average uncomplicated case it is a good rule to treat the anterior infection properly and the posterior urethra will respond to this medication. It has previously been pointed out that about one-third of the silver salt solution retained in the anterior urethra slowly enters the posterior canal thereby medicating it. This observation is confirmed by Klausner and Wiechowski, who have reported excellent results in acute posterior infections by merely medicating the anterior urethra with reargon, three or four times daily.

Occasionally it is desirable to bring a larger quantity of

^{*}This basin is manufactured by Geo. Tiemann & Co., and Frank S. Betz Company. A new model, improved as to shape and construction, is manufactured by the American Agema Corporation of New York.

the silver salt solution into the deep urethra. This can be done in two ways: First, by carefully injecting a second and third syringeful into the already filled anterior urethra, thereby gently driving the fluid into the posterior canal; second and preferably, by injecting the contents of a syringe holding ten or twelve drams.

Whichever method of treatment may be adopted, a watchful eye is kept on the prostate and seminal vesicles throughout the course of treatment. An examination is made twice weekly. The slightest intimation of tenderness or dull pain in the spermatic cord or scrotum demands a careful examination of the epididymes. Watchfulness often will prevent the development of complications. If the urethral infection seems to be increasing in intensity, if the urine contains more pus



Fig. 11.—Keyes-Ultzman syringe.

instead of less, and if the prostate shows evidence of congestion and inflammation, it is evident that the treatment is not controlling the infection. It is well then to stop all treatment or change the treatment and note the effect.

On the other hand, if the treatment is going well, it will be found that the prostate and seminal vesicles remain but slightly congested, the epididymes are uninvolved, the urethral discharge gradually ceases and the gonococci diminish in number or disappear entirely, the pains have gone and the urine when voided into two glasses has become clear, with perhaps a few shreds in the first glass. The reading of the two glasses should not be misinterpreted. Suitable investigation with the irrigation tests may show that the anterior canal practically is normal, but that the shreds have their origin in the posterior urethra. In other words, the posterior infection

still is present in mild degree, even though its former acute symptoms are gone.

We now are dealing with a subacute posterior infection, associated in all probability with a congestion of the prostate and both possessed of an inherent tendency to become chronic. This last feature should be remembered. It is the key to the prophylaxis of chronic gonorrhea. In this stage, deep instillations of silver nitrate give most excellent results. It is well to begin with a 1:200 solution, given about twice weekly with the Keyes-Ultzmann syringe (Fig. 11), watching the reaction and gradually increasing the strength to 1:100 or 1:150. Meanwhile the prostate is gently massaged once every four or five days and the massaged secretion repeatedly examined for pus and gonococci. Massage always is preceded preferably, or followed by an antiseptic intravesical irrigation. Occasionally it is advisable to instil silver nitrate (1:200) after massage instead of irrigating. Young has recommended the instillation of mercurochrome solution after prostatic massage.

If much mucus is found in the urine and by proper tests is found to have its origin in the anterior urethra (which is not infrequently the case), an astringent, preferable zinc sulphate, 1:200, may be substituted with advantage for the silver nitrate. Santal oil and its derivatives are indicated for internal use at this stage.

If the patient has had former gonococcal infections, it is now in order to make suitable examination for the presence of stricture or infected follicles in the anterior urethra; before the patient finally is discharged, the posterior urethra should be examined with the cystourethroscope and suitable treatment instituted if such is found necessary.

CHAPTER VII

COMPLICATIONS OF ACUTE GONORRHEA

The complications of acute gonorrhea are due perhaps to the invasion of secondary organisms (staphylococcus especially) as much as to the gonococcus. There is nothing essentially inherent in the nature of urethral gonorrhea to induce complications; this is well demonstrated by their frequency in the hands of some practitioners and their rarity in the hands of others. When seen early, acute gonorrhea should and generally can be confined to the anterior urethra by proper treatment. The presence of complications depends not so much on the disease itself as upon the conduct of the patient, his mode of living, the method of treatment adopted, and the strenuousness with which it has been applied.

It need not be emphasized that the personal equation is an important factor; what might bring on a complication in one man may have no effect on another. Nevertheless, the fact remains undisputable that certain methods of treatment are likely to favor an unduly large proportion of complications. It is not so much the fault of our remedies per se, as the methods of their application. Nature can be relied upon to combat the gonococci and other organisms, but is perfectly helpless against faulty methods of therapy. Our remedies often are too strong and irritating and they are employed too frequently; the result is a severe reaction and complications.

It is well to consider first the minor complications.

Periurethral Folliculitis and Abscess stand foremost. This is not a rare complication. At a given point along the urethra, a follicle may become the seat of infiltration followed by suppuration. It is at first appreciable as a tense swelling

of varying size, distinctly felt on the penile surface. The patient often calls attention to its presence. It may become absorbed or go on to suppuration. Usually when pus forms, the abscess ruptures internally and empties into the urethra; less frequently the abscess points externally and ruptures through the overlying skin. In either event, an annoying non-healing fistula or sinus may result and may persist indefinitely. Gonococci and other pyogenic organisms remaining within its lumen may set up a recurrent inflammation from time to time. It is best treated by opening the abscess surgically from without, rather than waiting for it to rupture spontaneously and form a blind pocket or sinus with its infectious possibilities.

Balanitis occurs in the presence of a long prepuce associated with uncleanness. Treatment consists in keeping the parts clean and dry with a dusting powder. The foreskin should be kept from contact with the glans penis by the insertion of cotton or gauze between these parts. When the foreskin cannot be retracted because of the edema and swelling, phimosis results.

Phimosis is best treated by prolonged hot water penile baths and thorough flushing of the preputial cavity with a mild, warm antiseptic solution. If retraction cannot be accomplished, a dorsal slit through the foreskin or a complete circumcision is imperatively indicated. Then the parts are kept clean and dry until healing takes place.

Paraphimosis results when the foreskin is caught behind the corona glandis and cannot be drawn forward over the glans. Manipulation must be resorted to to bring the foreskin forward. If this fails and the blood circulation of the glans is threatened, the encircling ring of tissue must be incised dorsally and the foreskin brought forward. In passing, it might be mentioned that circumcision in childhood prevents the development of these conditions in maturity.

Inguinal Adenitis usually is present in acute gonorrhea. The glands, though tender, usually undergo resolution. Pain and tenderness can be relieved as a rule by the application of tincture of iodine, ung. iodox and similar preparations. If suppuration occurs, incision and drainage are indicated.

Cowperitis is an inflammation of Cowper's glands (one or both), rather infrequently met with, but not always recognized when present. In a series of 200 cases, cowperitis was found in 12.2 per cent of cases.* It is one of the principal factors tending to chronicity. The inflammatory process in the glands can be detected by combined palpation through the rectum and perineum. Resolution is the rule, but if suppuration occurs, incision and drainage must be resorted to.

The Major Complications of Acute Gonorrhea

In considering the major complications, it is convenient to divide them into two groups: The first group comprises the complications which extend by contiguity, namely, prostatitis, seminal vesiculitis and epididymitis. In the second group are included those which extend by metastasis. The most important of these are arthritis, eye infections, infection of bones and cartilages, infection of the heart and of the peritoneum. Of these, arthritis is quite common and eye infections quite rare; the others much more so.

Acute Prostatitis

Few cases of acute posterior urethritis escape without some prostatic involvement. Anything that tends to increase the severity of an acute posterior infection is an exciting factor in the development of acute prostatitis. The most common cause is "overtreatment." A most important but rarely recognized predisposing factor in this complication is the presence of a preexisting chronic congestion of the prostate, non-specific in character, due to sexual excess, masturbation,

*Schischow and Smirnow: *Ztschr. f. Urol.*, Leipzig, 1926, xx, 241-320.

various forms of irritation, etc. It is not difficult to realize that a prostate already congested will not offer serious resistance to the advancing inflammatory process. See footnote, page 34.

The *catarrhal* type of acute prostatitis is the mildest, and its presence can be expected, in every case of posterior involvement. Usually it presents no characteristic symptoms. It is characterized by a superficial inflammation of the prostatic glands and ducts, consequent upon an attack by the advancing gonococcal inflammation. The inflammatory process usually remains localized in the region surrounding the verumontanum. If the process does not subside, but advances in intensity, the suppuration and exfoliation continue, the glands may become choked with pus and detritus and we have a *follicular* prostatitis. Numerous small pseudoabscesses form in the choked up follicles, which can be felt on rectal palpation as small, hard and tender elevations resembling seed. With the passing of the acute inflammation, the exudate may become absorbed and the organ and its glands may return to their normal state.

When, however, the acute inflammation persists, resolution does not take place. To the contrary, a number of glands break down and the inflammatory process attacks the substance of the organ. This results in a true *parenchymatous* prostatitis, the forerunner of prostatic abscess. The organ becomes highly congested, infiltrated, swollen and edematous, entirely or in part. The broken down glands may form small abscesses, which in turn coalesce to form larger abscesses. The intracellular connective tissue is more or less injured and destroyed. Examined per rectum, the organ feels hot and tense and very large, sometimes apparently filling the entire lower bowel.

When the acute inflammation subsides, resolution occurs and this marks the extent of the recovery. It is possible, though not usual, for the prostate to rid itself of the entire

inflammatory process and to return to its normal condition. If complete resolution does not occur, the process remains quiet and inactive for a time, giving rise to a new set of symptoms which characterize the presence of chronic prostatitis. When, however, the acute inflammation continues to advance instead of subsiding, the process leads to acute suppuration and we have a prostatic abscess to deal with.

Diagnosis.—The clinical symptoms of acute prostatitis usually depend upon the extent and severity of the inflammatory process, though cases occasionally are encountered in which the symptoms are out of all proportion to the pathologic conditions. The follicular variety does not present any particular diagnostic symptoms, except a general increase in the already existing inflammation of the posterior urethra. There may be an increased sense of pain or discomfort in the perineum, more frequent and painful micturition and defecation, and more pus in the urine. A positive diagnosis of acute follicular prostatitis based solely on its physical manifestations therefore is impossible.

In *parenchymatous* prostatitis, however, when the inflammation involves the deeper gland structures as well as the parenchyma of the organ, the diagnosis readily can be made. Examined per rectum, the prostate is large, at times filling the lower bowel and obstructing the passage of feces. Pain and perineal fullness are increased; urination is more frequent and perhaps bloody, with severe pain during and after the act. Partial or complete retention may supervene and add to the distress. There is a sensation of a large pulsating body in the lower rectum. Chordee is common.

If chills and a rise of temperature occur, with an increase in all the physical symptoms, we are dealing with a prostatic *abscess*. The patient looks and feels very sick; rectal examination is extremely painful, and the entrance to the bowel is obstructed by this great, hot, tender, pulsating mass; fluctuation usually can be felt.

Acute Periprostatitis; Periprostatic Cellulitis; Pelvic Cellulitis

Cases frequently are encountered in which the inflammatory process extends beyond the limits of the organ proper and results in an exudation into the connective tissues around and about the gland. This is especially frequent in connection with prostatic abscess, but less so with parenchymatous prostatitis. Subjectively, the symptoms are those of the coexisting abscess or inflammation, but they may persist even after the abscess has ruptured or been incised. Examined per rectum, the finger runs into a mass of soft, boggy, inflammatory edema, completely or partly surrounding the prostate and seminal vesicles and obliterating their outlines. The lower bowel is more or less completely filled with this boggy mass, which in some places may show signs of fluctuation. The diagnosis is made solely by rectal examination.

Treatment. -The treatment of **acute prostatitis** depends in great measure upon the degree and severity of the inflammation. The mild catarrhal and follicular forms of prostatitis demand no special therapy because they present no special symptoms. These forms of prostatitis respond fully to any well-directed treatment of the posterior urethritis. Treatment should be symptomatic and at the same time so directed as to control so far as possible, the gonococcal infection in the urethra.

In those cases in which the patient has been made the subject of overzealous treatment, it is imperative that all local measures be suspended. In such cases not only will the prostatitis be benefited, but the urethritis itself will diminish in severity under the relief thus afforded. When, however, there has been neither excessive nor too vigorous treatment, but, on the other hand, the treatment appears to hold the inflammation under control, it is wise to continue it and watch the results cautiously.

Parenchymatous prostatitis tends to undergo resolution in

spite of any or no treatment. Proper local urethral treatment is an aid in this direction. Intravesical irrigations, carefully made with the Carleton syringe, are of decided value. The important thing is the proper technic; much damage might be done otherwise. Utmost gentleness in administration and mild solutions are essential. The use of the new silver salts, as previously described, also is a most effective agent in this condition. In short, whatever is good for the urethritis necessarily will help the prostatitis.

Light diet, rest in bed, a saline cathartic and the local application of heat are invaluable measures of relief. Heat may be applied to the perineum either by means of the hot water bag, or better still, through frequently repeated sitz-baths and the recurrent rectal douche. The last is the most useful measure at command. The fluid is brought into direct contact with the surface of the prostate and gives almost immediate relief. In severe cases, the douche may be followed by a suppository containing extract of opium and belladonna, of each $\frac{1}{2}$ grain.

If urinary retention supervenes, the bladder should be emptied through a small calibered soft catheter and thoroughly irrigated with a mild antiseptic solution. A hot solution of silver nitrate, 1:6000, will be found unusually effective at times. Perineal section or suprapubic puncture may be required in cases in which catheterization cannot be performed.

Diathermy is of great value in these conditions. Its method of application is fully described in the chapter on Diathermy, beginning on page 185.

For internal administration, the alkaline solutions, the balsamics and the urinary antiseptics have their respective fields of usefulness. Sodium salicylate (Squibb) is of great value at times. At best we can only help to make the patient as comfortable as possible during the acute inflammatory stage.

Vaccines are of great value. Some prefer an autogenous vaccine, but my personal preference is for a polyvalent mixed vaccine, giving fairly large doses as frequently repeated as the reaction will permit.

As the acute stage begins to subside, prostatic massage, gently and cautiously performed, will be found useful. The finger should make the gentlest pressure; otherwise, massage not only is exquisitely painful but absolutely dangerous and harmful. This should be carried out every three or four days if the patient tolerates it well; otherwise it should be stopped entirely. Each massage should be preceded by an intravesical irrigation with a mild antiseptic solution. If the prostate is fairly hard and not tender, massage may be done every day to great advantage.

The instillation of a 1:200 solution of silver nitrate solution is another most effective measure, if used carefully and opportunely.

Excellent results may be attained, at times, by the intravenous administration of methenamine (new name for hexamethylenamine). Gram $\frac{1}{4}$, alone or combined with one gram of sodium iodide, in 10 c.c. of distilled water, may be given intravenously at 48 hour intervals, with considerable satisfaction.

A novel suggestion which has considerable merit, has been made recently by Belfield. He recommends that vasotomy be done in severe acute posterior infections not only as a curative measure for the prostatic and vesicular involvement, but also as a prophylactic against the development of complications,—abscess, epididymitis and arthritis. In a series of acute cases, he reports that no complications developed, while in sixteen cases of the series every vestige of the disease vanished within fourteen days after the injection. I have adopted this method in several cases with equally satisfactory results.

Acute Seminal Vesiculitis; Spermatocystitis; Perivesiculitis

This condition occurs so frequently in combination with acute prostatitis and the symptoms of both are so closely interwoven and fused that a differential diagnosis is practically impossible, even though such a diagnosis had any clinical

value. Diagnosis is made per rectum. Not infrequently, cases are seen in which the symptoms are so grave in character as to suggest the existence of peritonitis or a perforating appendicitis; it is quite likely that the abdomen has been opened time and again because of this error in diagnosis. On either side of the prostate in well-defined cases, a sausage-like mass can be felt by the examining finger, diverging from the median line. At times it is impossible to identify the vesicles because of the periprostatic exudate which surrounds them.

The symptoms are those of the concurrent acute prostatitis raised to a higher degree. In addition, there may be the characteristic frequent and painful seminal emissions, reddish or brownish in color because of the admixture of blood, which may be derived either from the vesicular cavity or from the inflamed posterior urethra.

Seminal vesiculitis rarely proceeds to suppuration; when this does happen, the symptoms are extremely marked and the patient looks septic. Relief is obtained when the abscess ruptures. Rupture may take place into the rectum or the urethra, the latter being the more favorable outcome. The natural tendency is toward partial resolution and chronicity.

Treatment.—The treatment is identical with that of the concurrent prostatitis, which already has been described. But owing to the anatomic character of the structures involved, a complete cure rarely is attained and the patient invariably is left with a chronic infection which requires much patient and arduous treatment (see page 176).

Prostatic Abscess

The culmination of the inflammatory process in the prostate is seen in the development of an abscess. This is, in fact, nothing more than a hyperacute prostatitis, which instead of responding to its natural tendency to undergo resolution has increased in intensity and culminated in suppuration.

The abscess may be single or there may be more than one,

located anywhere in the organ; they may be small or large. They may fuse to form one large abscess with considerable tissue destruction; there may be a number of miliary abscesses scattered throughout the prostate, or the abscess may be periprostatic, that is, involving the surrounding infiltrate but leaving the prostate proper intact. Many so-called prostatic abscesses really are periprostatic, situated close to the organ but not within its substance.

The **symptoms** of all prostatic suppurations are much alike. They are characterized, in brief, by those of acute prostatitis, carried to their maximum intensity, in addition to which is the diagnostic symptom of fluctuation, felt by the finger in the rectum. The patient is extremely ill and presents the typical picture of acute septic inflammation. Fluctuation always cannot be felt, because the pus-area may be deep seated and beyond the reach of the examining finger. The diagnosis of prostatic abscess may be made nevertheless, even in the absence of fluctuation, when the symptoms reach an inordinately high degree, with marked general toxic phenomena, high leucocytosis, hot and pulsating prostate, and high temperature with chills.

Occasionally, even with symptoms of moderate severity, the presence of abscess is not suspected and the diagnosis not made until the abscess ruptures spontaneously. This occurs frequently, the abscess usually opening into the urethra, but less frequently into the rectum. Cases have been recorded in which the abscess has opened into the perineum or abdomen.

When there is any doubt as to the presence of pus in the prostate and the general symptoms are strongly suggestive of suppuration, it may be necessary to secure this information by perineal puncture.

Treatment.—The diagnosis of abscess having been made, an attempt should be made to relieve the condition by the application of diathermy, as described on page 188, before resorting to surgical measures. If this is not successful, after a fair trial, however, surgical intervention is indicated, in order

to save the gland from inevitable further damage. The incision, of course, should reach the point of suppuration. If the abscess points toward the perineum, a perineal incision is made and the abscess drained. Puncture and aspiration through the perineum has been attempted with some measure of success. If the abscess points toward the rectum, it may be opened through that canal, care being taken to prevent infection from the bowel contents.

After a prostatic abscess has been opened, whether spontaneously or through surgical intervention, it is desirable to massage the prostate gently, several times weekly. By doing this, the accumulated pus is discharged more vigorously, the pus cavity is kept open and thereby encouraged to heal more quickly and thoroughly.

Prognosis depends more or less upon the size of the abscess. A small or moderate-sized abscess closes readily and recovery is quite prompt; a large abscess, however, offers considerable opportunity for the formation of an unhealing granulating cavity or sinus, with the possible development of pyemia and urinary infiltration. On the other hand, the spontaneous opening may close quickly before all the pus has escaped, thereby stimulating the formation of new abscess openings for the pus to make its exit. Rarely the abscess opens directly into the bladder. If spontaneous rupture takes place simultaneously into the rectum and urethra, there is a strong likelihood of the development of a urethrorectal fistula with the further possibility of urethral and vesical infection by fecal matter. The prognosis after operation always is better than that without it.

Orchitis

The testis proper rarely suffers acute gonococcal invasion, being strongly protected by the tunica albuginea. Occasional cases have been reported, however, in which the testis has been attacked, but in these cases it appears that the organ

was the seat of trauma preceding infection. In only three of the reported cases, was the gonococcus actually demonstrated.

Epididymitis

This is by far the most frequent of all the complications of gonorrhea and one of the most important sociologically, because of its remote consequences. Casper stated that 20 per cent of cases develop epididymitis; Taylor believed that 3 per cent is a high estimate. The average rate of incidence lies somewhere between these extremes, probably 5 to 10 per cent. It occurs much more frequently in one man's practice than in another's, depending upon the social status of his patients and upon the methods adopted in treating the urethral infection. In properly treated cases, this complication ought to be a great rarity. My private records, covering a period of twenty-five years and involving more than 5000 acute posterior infections, show a rate of incidence of less than one per cent. It may occur at any time during an acute infection and is not infrequently encountered in chronic cases without apparent cause. It is most apt to develop when the inflammation is at its maximum intensity. In some men there is a distinct tendency to recurrence long after the urethral symptoms have disappeared.

The exact causes of the development of acute epididymitis cannot be stated with certainty. Strong, irritant injections introduced violently into the deep urethra, the introduction of a catheter or an instrument into the bladder, vigorous massage of the prostate,—may and frequently do bring on an acute epididymitis. The Janet hydrostatic irrigation treatment also is frequently responsible for this complication, especially when employed carelessly or roughly. The pressure of a large volume of water against the inflamed cut-off muscle must be regarded as a therapeutic trauma. It is also possible that this fluid, under hydrostatic pressure, actually drives the gonococci backward into the ejaculatory ducts, leaving the

way free for their passage through the vasa deferentia to the epididymes.

It is likewise quite possible that the infectious element may be carried to the epididymis by way of the lymphatic system, but the comparative rarity of inguinal bubo or systemic infection coincident with the development of epididymitis would seem to argue against this method of invasion.

Cases have been reported by careful observers (Neisser, Jadassohn) from which it would appear that the epididymis may be attacked without the apparent existence of a posterior urethritis. In these rare cases, the infection seems to leap from the anterior urethra to the vas deferens without visibly affecting the posterior urethra. It is possible that in these cases the bacteria which have remained in the posterior urethra may have been carried off by the stream of urine, before they took root, so to speak, while those which managed to enter the ejaculatory ducts set up an inflammatory process which reached its culmination in the acute epididymitis. Generally speaking, however, it is practically impossible for epididymitis to occur without a previous inflammation of the seminal vesicle of the corresponding side.

There may be some association between this problem and the oft observed clinical fact that an acute epididymitis not only may clear the urine of pus but actually cure the gonococcal infection completely. I have also observed that the discharge may disappear and the urine become clear rather suddenly in the course of an acute infection, a day or two in advance of the appearance of an acute epididymitis. There seems to be no satisfactory reason for these phenomena except possibly the fact that the gonococcus loses its vitality at 39° C., and is totally destroyed at 40° or over. When the acute epididymal inflammation is associated with an elevation of temperature, it is possible that the gonococci immediately are destroyed, with subsidence of the infectious process.

Acute epididymitis usually is accompanied by an inflammation of the vas deferens of the affected side (vasitis, funic-

ulitis) or by an inflammation of the corresponding testis (epididymo-orchitis) or by both. Inflammation of the vas usually is not particularly apparent, being overshadowed by the painfulness of the epididymis, but it can be felt distinctly, as thick as an ordinary lead pencil and extremely tender to the touch; occasionally, the pain in the vas is quite severe and radiates upward and backward through the inguinal ring to the seminal vesicles, which share in the inflammatory process. This referred pain may lead to the erroneous diagnosis of acute appendicitis. An effusion of serous fluid into the cavity of the tunica vaginalis usually takes place, causing a hydrocele to form, especially when the testis shares in the inflammation.

The epididymis is enlarged to many times its normal size, the entire mass often attaining the size of a man's fist; it is hard and at times nodular. The tail is the portion most frequently attacked; that it suffers the most lasting damage is evidenced by the permanent infiltrate which remains for years after the acute inflammation. In a typical case, the finger can trace the groove between the swollen epididymis and the circumference of the testis; in this way, the size of the latter can be determined.

Diagnosis usually is made by the patient himself. He complains of pain, more or less severe, either in the epididymis or in the spermatic cord. Epididymitis cannot be mistaken for anything else. Not infrequently the patient's attention may be called to the presence of a recurrence of a chronic gonorrhea by the development of an acute or subacute epididymitis.

Symptoms.—The first symptom of acute epididymitis is pain, usually located in the epididymis itself or in the vas deferens as it emerges from the inguinal ring. This pain quickly increases and extends in area until the entire corresponding half of the scrotal content is agonizingly painful and sensitive to the touch. The general health soon suffers appreciably; usually there is a high fever, sometimes preceded by chills and sweating. Weakness and a sense of faintness soon

follow and the patient looks and feels very sick in a remarkably short time. Even the most gentle examination of the organ is associated with excruciating pain and may bring on an attack of syncope.

While most patients take to bed of necessity, a considerable number manage to be up and about and perform their usual work. At times the inflammation proceeds to suppuration and an abscess results. The usual course of the attack, however, is run in one to three weeks, after which period the pain and tenderness gradually disappear, the swelling recedes and the organ resumes something of its normal aspect. Resolution may not take place entirely, but a considerably thickened and infiltrated organ may remain, with the tendency to more or less frequent recurrence.

The prognosis is good. This, however, refers particularly to the acute inflammation. The pain and swelling having disappeared, a damaged organ remains. The damage consists in most instances of an induration of the epididymis, which usually remains for life, but this induration does not necessarily interfere with the functional capacity of the testis proper on the diseased side, though atrophy of the testis may follow in rare instances.

The most important functional damage consists of an interference with the passage of the sperma from the testis to the seminal vesicles, caused by the thickening of the walls of the convoluted tubes, which in turn narrows and occludes its lumen. The degree of interference is in direct proportion to the extent of the obliteration in the tube. Bilateral epididymitis, for this reason, is the most frequent cause of sterility in the male. There is no interference with the sexual power nor with spermatogenesis; the sperma are imprisoned within the testis and cannot emerge, thus producing a sterile semen. This condition is known as azoospermia. Finger found azoospermia in 207 out of a series of 242 cases of double epididymitis.

Painful testis, or testicular neuralgia, so-called, often fol-

lows acute epididymitis. There seems to be present a strong neurasthenic element in these cases, but the pain is a real one and very difficult to control. In extreme cases, relief is attained only through epididymectomy (see page 182).

A very important feature of epididymitis is the tendency to the subsequent development of tuberculosis. An acute gonococcal inflammation occurring in men predisposed or already infected with tuberculosis elsewhere in the body, undoubtedly tends to the formation of a tuberculous focus in the persistent nodule of the epididymis. Before its full development as a tuberculous focus, however, it partakes of the attributes of a simple, low-grade, chronic inflammation, which some French writers have termed "psendotuberculous."

When abscess of the epididymis follows the acute inflammation, we are dealing with a superimposed infection, either by the tubercle bacilli or secondary pyogenic organisms. Usually occurring in tuberculous individuals, these infections belong to the slow, chronic variety, with the production of sinuses and fistulas.

Treatment.—Mention has been made of the means that should be taken to prevent the occurrence of this complication. Rest (physical and sexual), gentle and skilfully applied local urethral treatment and a properly fitting suspensory bandage will contribute to prevent the occurrence of epididymitis; but once it has supervened, we should aim to diminish its severity, shorten its duration and avoid its consequences.

Epididymitis is successfully treated by various recently introduced methods, which are gradually superseding the older expectant methods and relegating them to obscurity. These methods will be considered seriatim:

Diathermy is extremely useful, though its introduction has been but comparatively recent. Its application in epididymitis is fully described in the chapter on Diathermy, beginning on page 185.

Intravenous Therapy also has met with considerable success. The patient is placed in bed, free catharsis is instituted,

and the affected parts are elevated and supported in the usual manner. One gram of sodium iodide in 10 c.c. of distilled water at room temperature is injected intravenously every 48 hours until the pain, tenderness and temperature rise have subsided. Generally it is not necessary to administer more than four or five of these injections. Reaction rarely is observed. Within twenty-four hours, there is a decided decrease in the pain and temperature. Practically all the induration is absorbed, as a rule, thus reducing to a minimum the subsequent development of azoospermia.

Methenamine,* gram $\frac{1}{4}$, alone or combined with sodium iodide, also has been used quite extensively, with satisfactory results. Mercurochrome-220, acriflavine and similar antiseptic dyes likewise have been used in this manner, with varying, but generally promising results. In my own experience, these methods have given results which justify the belief that eventually they will supersede the older expectant methods entirely.

Nonspecific Proteins have been employed with gratifying results. Sterile milk, turpentine and other protein substances are injected intramuscularly or subcutaneously. The turpentine injections are particularly effective, relieving the pain and lowering the temperature within a few hours after the first injection. In traumatic epididymitis these injections are equally effective. The method of administration is described at some length under the treatment of acute gonorrhea (page 66).

Direct Injection of Antiseptics into the inflamed epididymis has been employed. Young has used a 1 per cent solution of mercurochrome in this manner. He also reports having seen numerous cases treated during the war according to this method by Luys, of France. He employed electrargol. The method has not been fairly tested and its efficacy remains to be demonstrated.

*The name now given in the U. S. P., X, for hexamethylenamine.

Surgical Methods have been applied within the past decade, particularly in cases of the fulminating type, with most excellent results. The first step in this direction was puncture of the inflamed epididymis and aspiration of blood and serum, the purpose being to relieve the pressure within the swollen tunica vaginalis. This was followed by the Hagner operation (epididymotomy), which is the surgical method of choice at the present writing. The tunica vaginalis is opened at the junction of epididymis and testis; the fluid is evacuated, and multiple punctures or one incision made in the epididymis through its fibrous covering. General or spinal anesthesia is used. A drain is inserted and retained for a day or two. The wound is closed in the usual way.

This method is indicated in severe cases in which local methods have failed to give early relief, particularly in cases in which pus is present, when the swelling persists or increases and when a high leucocyte count is present. In my own experience, this has proved to be a most efficient treatment for these severe cases. The patient feels an almost immediate relief from the severe pain, the temperature returns to normal and the patient may leave his bed within a few days. The entire period of the inflammation is shortened considerably if the operation is done early. I believe diathermy and intravenous therapy should be employed first, but if there is reason to feel that pus has formed and there is considerable tension, incision is imperative.

If, however, the above-mentioned methods cannot be employed for any reason, measures which have proved useful in the past must be adopted. The primary indication is rest in bed, with suspension and elevation of the scrotum so as to remove tension on the inflamed cord. Elevation is supplied by a well-fitting T-bandage, jock strap, or better still, a shelf made of adhesive plaster, four to six inches wide and adherent to the upper surface of the thighs. The testes rest on this

shelf. Any arrangement that will bring the inflamed parts as high up as possible toward the umbilicus will bring relief to the patient.

Local applications are important. Heat and cold are employed, the latter most frequently, in the form of an ice bag. The bag should not come directly in contact with the skin, but should be separated from it by a thin towel or layers of gauze. Acetate of alum solution, 2:100, or a saturated solution of magnesium sulphate, cooled with ice and applied on layers of gauze, often give relief. Heat is best applied in the form of the poultice, preferably tobacco or linseed, or a combination of the two. The surface of the poultice may be sprinkled with laudanum in severe cases. It should be covered with a layer of oiled silk to retain the heat and as an aid to cleanliness.

After a few days' use of the poultice, or instead of it, ointments may be used. The standard formula for such an ointment is as follows:

R	Ichthyol	3 iss
	Guaiacol	3 ss
	Pulv. opii	3 ss
	Lanolini	ad 3 i
M.		

The penetrating odor of the guaiacol often renders it inexpedient to employ this ointment in ambulant patients for obvious reasons. An excellent substitute, odorless and efficient, is found in ung. iodox, an iodine preparation, which has proved useful in this condition, particularly in combination with equal parts of ichthyol.

Strapping the testis has, for some years, been a favorite method of applying the hyperemia to the epididymis, on the Bier principle, but its use has been superseded by the newer methods. It never should be applied during the first five or six days of the inflammation and should be continued only when its application is followed by quick relief. The original

method of overlapping strips of adhesive plaster applied directly to the skin is effective at times, but the crudity and discomfort, to say the least, of its method of application, should relegate it to the limbo of discarded therapeutic methods. Applied to the raw, tender, inflamed skin, it causes abrasions and severe dermatitis, all of which are entirely unnecessary. A preferable method of applying hyperemia is to use



Fig. 12.—Rubber bandage strapping (hyperemia) (Chetwood).

a strip of rubber bandage, eight inches long and two inches wide, to one end of which is attached a strip of adhesive plaster one inch wide and four inches long (Fig. 12). The scrotum is gently lifted and the unaffected testis pushed out of the way. The inflamed organ then is encircled with the rubber bandage as tightly as the patient can tolerate it and as the bandage is wrapped in place, the adhesive plaster is brought around and holds it fast. What is required is that

the swollen testis and epididymis, regarded as one mass, be brought within the pressure of the rubber bandage above its equator, for otherwise the bandage will slip off. It is evident that this bandage produces an elastic pressure on the blood supply above the inflamed organ, which can be regulated and adjusted in a moment by tightening or loosening it. As the swelling recedes, it is well to tighten the bandage to the point of comfortable tolerance (Chetwood).

Leeches applied to the scrotum, has been an age-long method of treatment, but not frequently employed at the present time. They merely relieve the severe pain. Bleeding may be severe because of the vascularity of the scrotal tissues; care therefore should be taken to control all bleeding points before leaving the patient.

For internal administration, nothing is better than copious draughts of plain water; fever and general malaise are treated in the usual manner; the bowels are kept loose.

It still is a debatable question whether or not it is advisable to continue local treatment during the height of the epididymal inflammation. It all depends on what treatment the patient has been getting. If he has been getting hydrostatic irrigations, they certainly should be stopped. It will do no harm and it may do much good, to administer by hand injection a mild solution of the silver salts, once or twice daily, retained ten or fifteen minutes.

The value of vaccines in epididymitis also remains undecided. I think it advisable to use them, unless the reaction produced is unduly severe. Autogenous vaccines are not useful in this condition.

Gonococcal Arthritis*

Gonococcal arthritis undoubtedly is the most damaging and maiming complication of gonorrhea. It occurs in from two to three per cent of all gonococcal infections. It may make it-

*The section dealing with the pathology and diagnosis of arthritis has been abstracted from McDonagh's "Venereal Diseases," 1920, page 313, because of the unusual brevity and clearness with which the subject is presented.

self manifest during any stage of the inflammation, the favorite site being one or more of the joints.

For years past, there has been continued and acute discussion as to whether gonococcal arthritis was a metastatic lesion, or a lesion due to the gonotoxine. The reason why several observers held the latter view was that they failed to find the gonococcus in the fluid which they drew off. I have examined the fluid from nine cases of gonococcal arthritis, in every one it was sterile. In those cases tested for the presence of antibody and antigen, the former was found, but not the latter. The reason why the gonococcus is not generally found in the fluid, is that it remains limited to the synovial membrane. It is just the same with the tubercle bacillus in a cold abscess. The organism is not found in the pus, but in the wall of the abscess. It is now almost universally agreed that a gonococcal arthritis is a metastatic lesion.

No case of gonococcal arthritis should be treated lightly, because a joint affected from any specific cause is always liable to become secondarily infected. If any one has seen a pyogenic infection of a gonococcal joint, the picture is not likely to be forgotten. Within a few days of the joint's becoming purulent, the patient may die, and should the case not terminate fatally, bony ankylosis is all that can be hoped for.

Gonococcal arthritis can generally be prevented, if all gonorrheal patients are strictly forbidden taking any exercise, a point which is proved by the enormous numbers of soldiers who have been invalided home during this present war with joint trouble.

Before a true arthritis becomes manifest, the patient usually experiences fleeting sharp pains in the joint which is to become affected. If rest is ordered, and if vaccines are injected without delay, the progress of the inflammation may be checked.

The statement has frequently crept into writings that women are immune from gonococcal arthritis. Such is far from being true, as both men and women are equally affected.

A man who contracts gonococcal arthritis is practically certain to have a prostatourethritis, and a woman is certain, at least, to have a cervicitis. More often she has an endometritis, and in many cases she has a salpingitis. Therefore, no case of arthritis should be treated without the main attention being paid to the site from which the organisms enter the blood stream. It must not be forgotten that, although we generally refer to adults when speaking of gonococcal arthritis, the complication may also occur in cases of infantile gonococcal conjunctivitis, and it is not at all uncommon in cases of vulvovaginitis affecting young girls.

An arthritis may complicate the first attack of gonorrhea, but it more often starts during the first or second recurrence of the uncured original attack. Should the patient have repeated recurrences of his urethritis, and an arthritis of one knee joint, which complicated his first recurrence, this same knee joint is apt to light up again in each future recurrence. This condition of affairs is quite pathognomonic of gonococcal arthritis. The types of gonococcal arthritis allow

themselves to be conveniently divided into four classes: (1) *Hydrops articuli*; (2) *serofibrinous arthritis*; (3) *purulent arthritis*; (4) *phlegmonous arthritis*.

1. *Hydrops Articuli*.—Usually without any warning, a joint, which is most commonly the knee, becomes suddenly distended with fluid. The joint is not even painful. The fluid may disappear as quickly as it came, recurrence is common, and, as the amount of fluid may be considerable, repeated distention of a joint is liable to lead to a destruction of its ligaments. More rarely the fluid takes a long time to disappear. In these cases, if the distention is very marked, it is imperative to tap the joint.

A joint should never be tapped except under the strictest aseptic precautions. The knee is practically the only joint for which the operation has to be undertaken. The limb is extended and a Barker's lumbar puncture needle is inserted between the external condyle of the femur and the external tuberosity of the tibia. The fluid should be allowed to escape only slowly, and, after it has been removed, a Martin's rubber bandage should be applied from below upwards, and the patient should be kept at rest. If the knee is not bandaged at once, it may fill up again with fluid in an hour or two. Subcutaneous injections of the withdrawn fluid in the region of the affected joint has never, in my experience, been of any benefit.

The synovial membrane and capsule remain thin, in cases of *Hydrops articuli*.

2. *Arthritis Serofibrinosa*.—This is by far the most common form of gonococcal arthritis. Both the synovial membrane and capsule are usually thickened. The withdrawn fluid looks not unlike serum, and it is called fibrinous, owing to the amount of contained fibrin, which frequently causes the fluid to clot.

With this form of arthritis the patient usually looks very pale and ill. The muscles along the joint soon become atrophied, and any of the focal complications which have been described may accompany this form.

This form of arthritis is very liable to recur, and at each recurrence the capsule becomes still more thickened. Owing to the amount of fibrin which has formed, adhesions are liable to follow the subsidence of the inflammation.

3. The *purulent arthritis* usually arises from the serofibrinous form, becoming infected with pyogenic cocci.

4. *Phlegmonous arthritis*, which was so christened by König, is an arthritis in which the capsule and the periarticular tissues are the structures most affected. The joint is often markedly swollen, but the amount of fluid in it is very small. This form of arthritis has frequently received the name of pseudomembranous. As the inflammation is most acute in the periarticular tissue, the subcutaneous tissue is edematous, and the skin over it is very red and painful. The inflammation quickly spreads to the interior of the joint, and destroys all the ligaments, hence it is in the phlegmonous arthritis that subluxation of the tibia, and other orthopædic deformities are most likely to occur.

In phlegmonous arthritis, absolute rest should be enforced, since, owing to the acuteness of the inflammation, a pyogenic infection is apt to find its way into the joint. Vaccines should be injected as quickly as possible. All the antiphlogistic measures should be employed, and the limb fixed in that position in which bony

ankylosis would least impair its usefulness, since bony ankylosis is the result to be hoped for.

In the mild cases of phlegmonous arthritis, and in the chronic cases of arthritis serofibrinosa, changes in the joint may be produced which become indistinguishable from the condition that is called osteoarthritis. The cartilage is worn away, the bony surfaces become eburnated, and the edges develop osteophytic growths. I have notes of three cases of gonococcal osteoarthritis of the hip joint, in one of which the head of the femur had already been dislodged from the acetabulum; and of two cases of a similar condition, affecting the knee joint. Naturally, treatment in such cases is unavailing.

Although polyarticular arthritis is not uncommon in gonorrhea, the monoarticular form is certainly the more frequent. As a rule, not more than two or three joints are affected at a time, although several may be affected at different intervals.

Owing to the small size of the finger and toe joints, periarticular changes are practically constant; and as these almost invariably lead to a chronic complication of these tissues, the patients usually have a permanent broadening of their fingers and toes, at the metatarso and metacarpophalangeal joints.

Any patient who has had a gonococcal arthritis is very likely to suffer for years afterwards with what may be called arthralgia. Such patients are apt to notice changes in the weather and changes in temperature. It is well to bear this arthralgia in mind, as it is often mistaken for a recurrence of the arthritis. The local application of unguentum iodox or colloidal iodine oil, or unguentum guaiacol (10 to 40 per cent) quickly disperses the arthralgic pains.

The knee is far and away the most frequent joint to be affected, indeed Hydrops articuli is rare in any other. After the knee, come the ankle and wrist joints. The metacarpo- and metatarsophalangeal joints are frequently affected, also the other small joints of the foot. Arthritis of the joints of the upper extremities, other than those already mentioned, is not very common. The elbow is affected more often than the shoulder; in many cases it is the only joint affected and there is usually a marked wasting of the muscles along the joint. When the hip joint is affected, it is usually the only joint that is involved. Any joint may be affected, but arthritis in other than those already mentioned, is rare.—(McDonagh.)

It is important to differentiate gonococcal arthritis from other types of joint infection. This is particularly true in the subacute and chronic types, which may be mistaken for joint tuberculosis. Both conditions have symptoms in common; thus there is a general decline in health; the temperature and pain are variable. But the diagnosis can be made on these data: The presence of an existing gonococcal infection, acute or chronic; more than one joint usually involved, in tubercu-

losis rarely so; as a rule, there is more pain and tenderness; there is more marked swelling and discoloration and there is a greater tendency to involvement of the tendons and fascia than in tuberculosis; in the latter disease, there may be and often is a tuberculous focus elsewhere in the body or a history suggestive of tuberculous; tubercle bacilli may be found in the exudate, as against the presence of gonococci in gonococcal arthritis. Furthermore, in the latter type, the complement-fixation test if properly performed, should give a positive reaction. It may be accepted as a general rule, that in cases with a negative reaction combined with negative clinical and cultural findings in the prostate and seminal vesicles, we are safe in concluding that the arthritis is not gonococcal in origin.

The **prognosis** of gonococcal arthritis is favorable in the average case, though the probability of ankylosis and impairment of function is considerable. In severe cases, permanent ankylosis, hydrarthrosis and suppuration may supervene; usually, however, the inflammation subsides slowly but surely and resolution takes place. The amount of permanent damage is in inverse proportion to the degree of resolution.

It should be remembered that with each new attack of gonorrhea the arthritis may recur, irrespective of the result attained in past attacks. A prognosis as to permanent cure should include this reservation.

Treatment.—There is no specific therapy for gonococcal arthritis. The one thing to guard against is the formation of adhesions. The usual treatment of inflammatory arthritis (rheumatism) is of no benefit whatever in this condition. Drugs have proved practically useless. Most important of all is the treatment of the gonococcal infection, both through local and constitutional measures. Rest in bed and immobilization, are imperative in the acute stage. Local applications to the inflamed joint have their field of usefulness. A favorite method is the local application of pure or 50 per cent ichthyol to the parts, covering them well with cotton or flannel; methyl

salicylate may be used the same way with benefit. An ointment, which has proved of distinct value is the following:

R	Ichthyoli	3 iss
	Guaiacoli	3 ss
	Pulv. opii	3 ss
	Lanolini	ad 3 i
M.		

In the subacute and chronic stages in the presence of large accumulations in and about the affected joints, radical surgical measures may be necessary. The joints may be tapped, the fluid withdrawn, and the joint irrigated with a hot antiseptic solution. Incision, followed by irrigation and drainage often is made necessary by existing conditions. For cases that are chronic from the beginning, with little or no exudation, the application of counterirritation, such as the Paquelin cautery, blisters, iodine and ichthyol, followed by frictions, massages, douches, etc., often will be found useful.

Recent Methods of Treatment bid fair to supplant these time tried measures.

Diathermy has given unusually fine results. It is distinctly sedative to the inflamed joint. Some of its advocates speak of it as a specific in gonococcal arthritis, because of the inability of the organisms in the joint to survive in the heat generated by the electric current. The gonococcus is destroyed in the joint, but the original focus in the prostate and seminal vesicles must be eradicated before a complete cure of the inflamed joint is to be hoped for. Its application is described on page 190.

Vasotomy (Belfield's Operation) has for its purpose, the sterilization of the infectious focus in the seminal vesicles. The injection of an antiseptic solution into the seminal vesicles and the improved drainage of these sacs thereby achieved, constitutes a most valuable advance in the management of gonococcal arthritis. I have found it of the greatest value and regard it as the most dependable single measure for

the relief of this condition. The joint lesion responds almost immediately to the attack on the focal point in the vesicles. Aided by the administration of diathermy and a polyvalent mixed vaccine, I have seen a quick and lasting response in joint cases which have resisted all other treatment. The operation is described on page 179.

Mercurochrome-220 in intravenous injections has been successfully used by Young and other urologists. It is employed in the manner already referred to (page 68.) The recorded experiences of this procedure are too meager, however, to warrant any positive conclusions at this writing.

Pregl's Solution has been used by Stelwagon, with striking results. This is an aqueous isotonic iodide and iodate solution; the amount of available iodine is 3 per cent; 5 to 10 c.c. are injected directly into the seminal vesicles through the rectum. Owing to the osmotic properties possessed by this solution, the fluid quickly diffuses throughout the tissues of the vesicles and its therapeutic effect is carried to a point beyond the immediate area injected. Administration is not followed by pain, reaction or abscess formation. Three or four injections have brought about a cure of the joint involvement and the elimination of the infectious foci in practically all acute cases. Stelwagon states that the best results are obtained in the extremely acute cases with much effusion.

Bier's Hyperemia method was introduced some years ago and has been useful to a considerable degree. In the acute conditions, it is employed from the very beginning of the attack. The bandage should be applied not too tightly and should not be combined with local applications of cold or heat, for the best results. The bandage is kept in place about twenty hours continuously, then withdrawn for a few hours and again applied intermittently until the joint inflammation has materially receded. .

Under this method of treatment, the pain rapidly diminishes in intensity or disappears entirely; movement of the parts

may be encouraged quite early, thereby reducing to a minimum the danger of subsequent ankylosis or muscle atrophy.

Vaccines constitute a most valuable addition to any method of treatment that may be adopted. As previously stated, my personal preference is a polyvalent mixed vaccine, containing 400 million gonococci to the dose. Autogenous vaccines have not given me the results said to have been attained by others.

Vesiculotomy (drainage) and **Vesiculectomy** (excision) are indicated in extremely severe cases, rebellious to other methods of treatment, but the results of these radical procedures have not generally justified early expectations.

It need not be emphasized that the employment of the more recent therapeutic methods do not necessarily exclude the use of older time-tried measures, which already have been enumerated. These measures often are intrinsically of great value.

McDonagh considers most of the therapeutic measures generally employed as superfluous, since the advent of his chemotherapeutic treatment; his views are substantiated by reports from some of his noted countrymen, though opposed by others. He says: "Intramine has proved particularly valuable in gonococcal arthritis, provided it has been prescribed early enough. Intramine gets rid of the pain so quickly that I never find it necessary to keep a joint at rest." He also recommends that colloidal iodine be prescribed internally, 5 iii t.i.d. post cibos. For the arthralgic pains which often characterize chronic cases, he recommends the local employment of iodox ointment or of guaiacol ointment (10 to 40 per cent).

CHAPTER VIII

CHRONIC GONORRHEA

Exactly when acute gonorrhea ends and chronic gonorrhea begins, it is impossible to say. Some acute cases run their course in four to six weeks and others persist even under the most skillful treatment for two or three months without showing any evidence of chronicity. There is no sharp dividing line between the acute and chronic stages of the disease; nevertheless, it is safe to say that any acute gonococcal infection which has not been completely cured within ten or twelve weeks rightfully may be considered chronic.

"Chronic gonorrhea" is an inclusive term which serves to describe any long standing inflammation of the genitourinary tract due to gonococcal infection, even though the gonococcus cannot be isolated in the secretions.

Diagnosis at times is rather difficult, particularly since chronic gonorrhea always is dependent on some pathologic condition secondary to the original infection. Certain features stand out prominently as against the acute stage, viz., the comparatively slight or absent urethral discharge; absence of acute pain or urinary urgency; comparative rarity of complications; frequency of reflex neuroses; tendency to recurrence; variable potentiality of infection inherent in the genital secretions.

Method of Examination.—The examination is of the greatest importance in making the diagnosis. The steps necessary may be summarized as follows: Complete history; inspection of the external genitals; microscopic examination of urethral smear (if obtainable); urinary tests to determine the source of shreds and pus in the urine; palpation of the prostate and seminal vesicles; culture and examination of the expressed prostatovesicular secretion; examination for stricture; ure-

throscopy (anterior urethra); posterior urethroscopy, if the findings point to posterior infection.

In taking the sexual history of the patient, it is essential to obtain these data: the number of previous infections, if any; their date and duration; also, if possible, the kind of treatment administered and by whom; complications, if any, during these previous attacks; frequency of coitus; whether the patient is single or married; if the latter, how long married, number and ages of children and also the genital health of the wife. The latter is of great importance. These data should be recorded.

Inspection of the genitals follows. A small urinary meatus predisposes to chronicity; meatotomy is strongly indicated. A thickened epididymis indicates that severe posterior infection has occurred at some previous time, provided traumatic epididymitis can be ruled out.

A smear having been made of any existing meatal discharge, we now proceed to determine whether the lesion is located in the anterior urethra, or posterior, or both. This method has been fully described on page 48. To repeat briefly, the anterior urethra is thoroughly irrigated until the washings come clear and the patient voids about an ounce of urine into a clean glass. The anterior urethra having been cleansed, any shreds or pus thus voided necessarily must have originated posterior to the cut-off muscle.* We may summarize the findings of this test as follows: If the washings in the first glass contain pus or shreds and the voided urine is clear, we probably are dealing with a *chronic anterior* infection† (Fig. 13); if the washings of the anterior urethra contain pus or shreds and the voided urine is not clear, we

*If pus is found in the voided urine, it may have its origin in the bladder or upper urinary tract. To determine this question, the Five Glass Catheter Test, described on page 108 must be employed.

†It should be remembered that this does not eliminate the possibility of prostatic or vesicular infection, because it is not unusual for a patient to void perfectly clear urine and still have a chronic infection of these organs, with pus and bacteria in large quantities. Massage of the prostate and seminal vesicles reveals the true condition of these organs; if infection is present, the urine voided after massage will contain pus and shreds, but if it is not present, the urine voided after massage will be quite clear or perhaps slightly hazy.

are dealing with a chronic *anteroposterior* infection (Fig. 14); if the washings from the anterior urethra come perfectly clear, but the voided urine is turbid or contains shreds, we

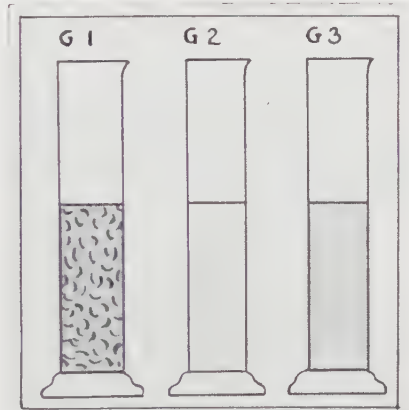


Fig. 13.—Chronic anterior urethritis, irrigation test. G 1, anterior urethral washings; G 2, control; G 3, voided urine.

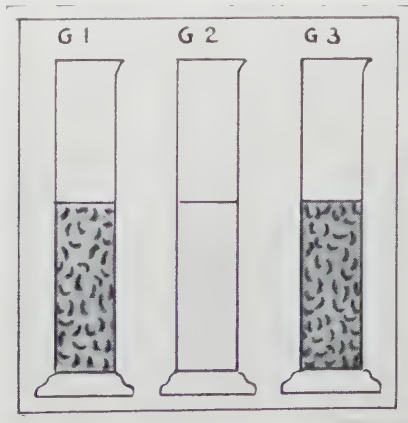


Fig. 14.—Chronic anteroposterior urethritis, irrigation test. G 1, anterior urethral washings; G 2, control; G 3, voided urine.

are dealing with a chronic posterior or upper tract infection, without anterior involvement (Fig. 15); lastly, if the prostate is carefully massaged and the voided urine contains much pus

and detritus, we are dealing with a chronic prostatitis (Fig. 16).

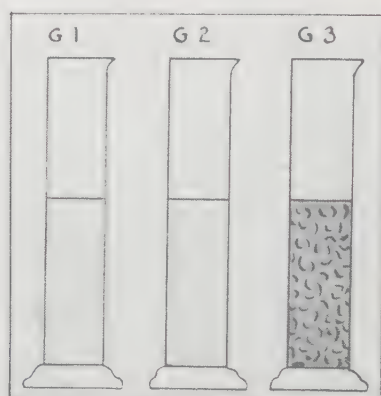


Fig. 15.—Chronic posterior urethritis, irrigation test. G 1, anterior urethral washings; G 2, control; G 3, voided urine.

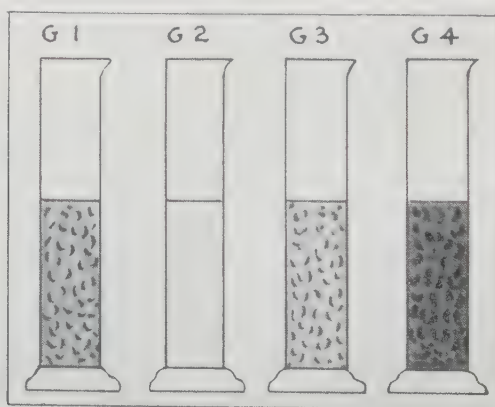


Fig. 16.—Irrigation test in chronic anteroposterior urethritis involving the prostate. G 1, anterior urethral washings; G 2, control; G 3, voided urine carrying posterior urethral pus or shreds; G 4, urine voided after prostatic massage.

Five Glass Catheter Test (Wolbarst).—In cases of long standing and of doubtful clinical history, in which there is reason to suspect that infection may exist in the upper urin-

ary tract, this test will be found invaluable.* By means of this test it is rather easy to separate mechanically and accurately the *débris* from the anterior urethra, posterior urethra, prostate, seminal vesicles and upper urinary tract, eliminating all guesswork and speculation. In the most complicated cases, this test will be found dependable and simple in execution. The information thereby derived is of inestimable importance in determining the source of pus and shreds in the urine. The test is performed as follows: The patient comes with a full bladder. The anterior urethra is washed out carefully until the washings come clear (Glass 1); this gives us the *débris* from the *anterior* urethra. Further washing of the anterior urethra gives us a "control" glass (Glass 2). A fine soft catheter now is introduced into the bladder and an ounce of the bladder urine drawn off into Glass 3; this gives us the *bladder* urine, uncontaminated by contact with any part of the urethra. If this urine is clear, we *know positively* that the bladder and upper urinary tract are normal. This knowledge is extremely valuable. The catheter is withdrawn and the patient voids an ounce of urine into Glass 4; this gives us the *débris* washed from the *posterior* urethra. It is evident that these *débris* necessarily must come from the posterior urethra and from no other part of the tract. The prostate now is massaged and urine voided into Glass 5; this gives us any pus that may have been expressed from the *prostate*,—also uncontaminated, having been passed through a urethral canal that has been thoroughly cleansed. A clear urine in this glass may be accepted as evidence that the prostate is normal. If it is desired to strip the seminal vesicles, together or individually, this may be done and the urine voided after each stripping into a separate glass (Glasses 6 and 7). Usually it is sufficient for practical purposes to massage the prostate and seminal vesicles at the same time; at a later examination, if it is so desired, each

*This test has been reported favorably in the works of many urologists, notably Sir Thomson Walker and Lumb. (England), Georges Lays (France), Oelze (Germany), Wiener (Belgium), V. C. Pedersen (New York) and Lowsley and Kirwin (New York).

vesicle may be stripped individually and the urine collected in separate glasses.

When, however, the urine drawn from the bladder per catheter is not clear, we draw off all the bladder urine and with the catheter in situ, we carefully irrigate the bladder with a bland solution and inject five or six ounces of the fluid; with this clear fluid in the bladder, we proceed with the test as though the bladder urine were clear.

It is readily seen that with the aid of this test, it is not a difficult matter to determine the origin of pus and shreds (or blood) as between the anterior urethra, posterior urethra, bladder, prostate and each of the seminal vesicles. In the diagnosis of chronic gonococcal infections, this information is of the highest importance.*

Examination of the Urethra.—The next step toward making a complete diagnosis is to determine the condition of the

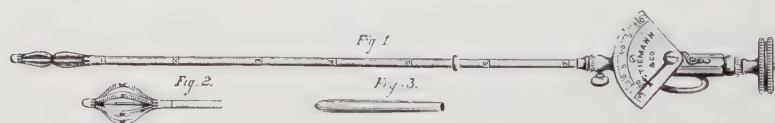


Fig. 17.—Otis urethrometer.

urethral mucosa, especially with reference to the presence of infected follicles, stricture and infiltrations. The urethroscope is used for the former, the Otis urethrometer for the latter. This is an extremely valuable instrument (Fig. 17). The dilating extremity of the urethrometer is protected by a rubber cover, made for the purpose; before being used it should be tested by quickly expanding the extremity to its maximum extent (45 French). This insures the trustworthiness of the rubber cap. The instrument is sterilized, cap and all, and introduced gently down to the deep urethra, the bulb being at its minimum (15 French) size. This dilatable bulb is now expanded by turning the revolving cap up to 30 French, as indicated by the index and the instrument gently drawn for-

*For a graphic reading of this and other tests, consult Plates VI and VII, pp. 196 and 198.

ward toward the meatus (Fig. 18). Any infringement on the urethral caliber is made apparent by an interference with the passage of the instrument. If the instrument, keyed up to 30 French, passes from the urethral bulb to the meatus without obstruction or interference, we may eliminate the presence of a definite stricture in the anterior urethra. It often is advisable to dilate the examining bulb up to 33 or 35

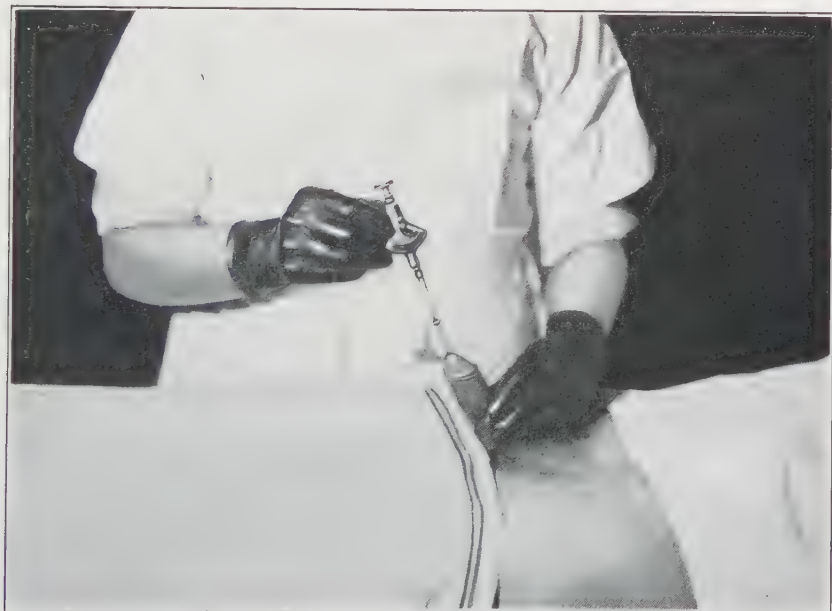


Fig. 18.—Otis urethrometer in position.

French. This reveals the presence of fine bands or infiltrations, the only pathologic evidence that can be obtained. These bands generally constitute the beginning of a true organic stricture. For the examination of the deeper parts, a blunt sound, 28 or 29 French caliber, is passed down to the bladder. If the meatus is too small to admit so large a sound, it should be enlarged by meatotomy. The patient thereby not only will be in position to have the examination made, but will gain the advantage of the improved drainage afforded by

the larger meatus. There is no substitute for meatotomy in these circumstances.

If the sound enters the bladder without difficulty, the possibility of a deep-seated stricture may be eliminated. The examination for stricture should be followed by an antiseptic irrigation. Of course, it goes without saying that these procedures require the utmost gentleness and caution; otherwise much damage may be done. This is true of all urethral instrumentation.

Examination of the Prostate.—The prostate now is examined to determine the presence or absence of disease. This is a very important step in the diagnosis and should be done with the greatest care and accuracy. It goes without saying that the surgeon should be able to distinguish between the normal and pathologic prostate. The organ must be studied in health and in disease in order that variations from the normal may be recognized. It is better for obvious reasons, that the bowel be emptied at least several hours before the examination is to be made. The position of the patient also is important. Some surgeons prefer the gynecologic position, but this position, in spite of some advantages, has not commended itself to most practitioners; others recommend the knee-chest position. I prefer to examine with the patient in the semierect position (Fig. 19), the body flexed on the thighs, the arms resting on a chair or table in front. The bladder should be tolerably full. The surgeon's examining arm should be in a direct line with the anteroposterior axis of his body, the elbow resting snugly in the corresponding groin, so that the weight and force of his body may be utilized in advancing the finger as far forward as necessary. The surgeon's free hand may be applied to the corresponding groin of the patient and moderate pressure applied to the abdominal muscles. This helps to bring the vesicles nearer to the examining finger.

In passing, it is well to remember that some patients sustain a nervous shock and may fall in a faint when the finger

makes pressure on the prostate, be it ever so gentle. The surgeon always should be on guard for this possible occurrence.

With the patient in the semierect position, the prostate is normally appreciated by the palmar surface of the gloved finger as a somewhat flattened spherical mass, about two inches in a transverse diameter and divided into two lobes laterally by a more or less distinct groove or depression run-

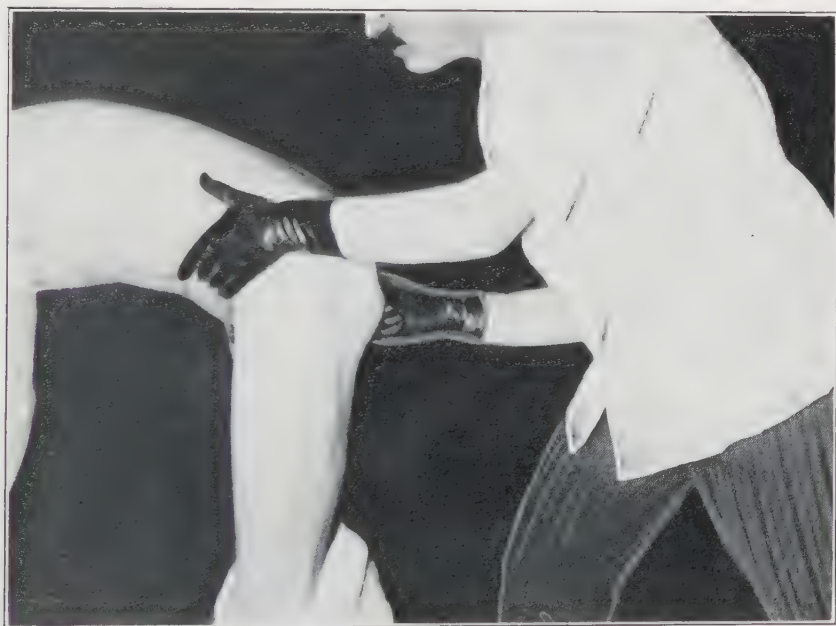


Fig. 19.—Correct attitude in examining the prostate.

ning anteroposteriorly. Normally the finger can be carried around the margin of the organ, from base to apex (the base being above, the apex below) on one side, and then on the opposite side, and finally anteroposteriorly between the two lobes, to determine the presence or absence of the interlobar groove. This sweep of the finger is of great importance; it tells us whether the organ is small, normal or large, either as a whole or as to its respective lobes; also whether there

exists a periglandular inflammation marked by the presence of exudate and adhesions to adjacent tissues and structures. If the circumference cannot be distinctly outlined by the finger as it sweeps around the organ, we may take it for granted that the prostate is enlarged and that exudation has taken place around and about it. We now investigate the organ proper for evidence of hard or soft areas, nodules, areas of tenderness, pulsation, and fluctuation.

Seminal Vesicles.—While making note of the condition of the prostate, the seminal vesicles also are examined. As a rule, they will be found enlarged in sympathy with the inflammation in the prostate. In the average case, the vesicles are felt emerging from either side of the prostate, as a thick, hard body, standing out boldly in outline or as a part of the general mass of exudate. More often, we feel the extremity of the vesicles, one or both, hanging free in the pelvis and appreciable to the examining finger as a round, semisolid mass, about the size of a hazelnut, suspended from above, moving freely and slipping away from the finger on contact. When considerable exudation has taken place, the vesicles seem to be fused into one solid mass with the prostate, losing their identity to a greater or lesser degree.

Microscopic Examination of the Prostatovesicular Secretion.—The entire urethra having been irrigated, the prostate and seminal vesicles are carefully massaged and stripped and the expressed secretion caught on a clean glass slide as it emerges from the urinary meatus. The slide is held directly under the meatus, either by the patient or with the free hand of the surgeon. This step is of maximum importance, for in the ultimate analysis, the crux of the entire subject of chronic gonorrhea lies in the bacteriologic character of the secretions of these organs. The specimen is thoroughly examined for bacterial organisms and pus cells. Any specimen of prostatic secretion showing more than four or five leucocytes in a $\frac{1}{6}$ objective field is suggestive of chronic prostatitis. A conscien-

tious search for organisms and pus cells will give a positive finding in a surprisingly large proportion of cases when it was least suspected.

The smear having been taken, the patient voids again; if he have no urine, the bladder is filled with a bland solution. This fluid when voided brings out all the prostatic and vesicular débris and will contain clumps of pus and epithelia, in which bacterial organisms also may be found in large numbers. The urine is much more cloudy than it was when voided before massage. In general, very little material is expressed by massage from the hard, small, fibrous prostate; when, however, the organ is soft and congested, large quantities of prostatic fluid can be expressed with slight effort. In cases with extreme congestion, in which the organ is large, soft, flabby and atonic, the mere impact of the finger is sufficient to cause a profuse flow of prostatic fluid to the meatus and upon the slide. The same is true of the seminal vesicles. In markedly congested cases, stripping the vesicles brings forth a flow of fluid in which may be seen large clumps of material, which are, in effect, actual casts of the vesicular tubules. It is worth remembering that it is quite difficult, if not almost impossible, to obtain separate prostatic and vesicular contents by massage or otherwise, though various methods have been devised with this object in view.

When it is impossible to obtain prostatic and vesicular fluid at the meatus by massage, the best we can do is to secure the urine voided after massage and submit this urine to microscopic and cultural examination. Culture is far better than the mere microscopic examination, though this makes for some delay in reaching a definite diagnosis.

In a fairly large proportion of cases with symptoms of chronic gonorrhea with clear urine, careful massage of the prostate and seminal vesicles and microscopic study of the expressed secretion will reveal the presence of pus cells and bacteria, thus disclosing the cause of the chronicity and the recurrences. If the organisms are not found in the expressed

secretion on culture after repeated tests, it is safe to consider the case nonspecific (catarrhal) in character. A diagnosis of chronic prostatitis and vesiculitis should be made if the microscope shows the presence of pus cells, with or without bacterial organisms.

Urethroscopy.—The final step in the diagnosis brings into use the urethroscope. The technic is extremely simple; the interpretation of the findings is just the reverse. For the *anterior urethra*, the Luys (Fig. 20) or Chetwood urethroscope is to be preferred. The tube and its obturator are sterilized, the size selected being the largest that will com-



Fig. 20.—Profile view of Luys' urethroscope.

fortably pass through the meatus. If the patient is unusually sensitive, it is well to anesthetize the urethra with procaine or alypin solutions, 2:100, retained five to ten minutes. The instrument is lightly lubricated and gently inserted into the canal down to the bulb (Fig. 21). The ordinary straight tube never should be passed into the deep urethra, because the amount of hemorrhage, distortion and trauma to the mucosa caused by this procedure is far greater than the value of any practical results derived from it.

The bulb having been reached by the tip of the instrument, the obturator is withdrawn, the mucous membrane lightly

swabbed with dry cotton at the end of an applicator and the lamp carrier inserted (Fig. 22). Examination of the canal is made by slowly withdrawing the tube and studying the mucosa as it recedes from the end of the tube, in the same manner as one would study the landscape from the observation platform of a moving train (Fig. 23). Every portion of the mucosa is made visible and the smallest pathologic changes can be noted. The instrument finally is withdrawn when the

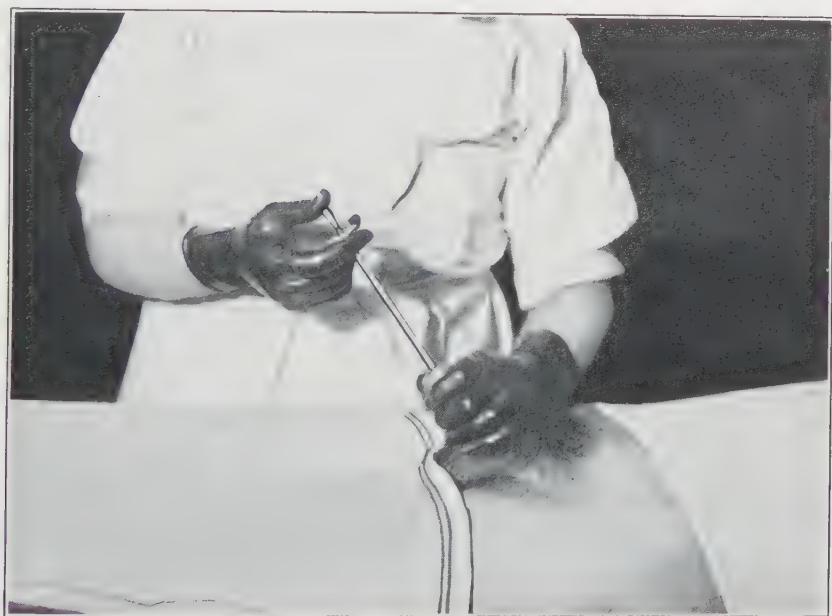


Fig. 21.—Inserting the urethroscope.

fossa has come into view and the canal cleansed with a mild antiseptic, preferably one of the silver salts.

The normal and pathologic appearances to be observed with the aid of the urethroscope have been so clearly described by Casper* that one cannot do better than quote his words on the subject:

*Casper: Text Book of Genito-Urinary Diseases, English translation by C. W. Bonney, Philadelphia, P. Blakiston's Son & Co., pp. 20-24.

In normal cases the following picture is presented: At the end of the tube a tunnel is seen whose base is formed by the edge of the tube, its apex being further back, and its sides being formed by the walls of the urethra (Gruenfeld's central figure). If the tube lies in the long axis of the urethra, this central figure will form the center of the urethroscopic picture, having the form of a fossette in the deeper portions, and becoming a mere fissure at the meatus. The wall of the tunnel is formed by the walls of the urethra, upon which the color, lustre, duplicature and striation of the mucous membrane are to be observed.

In almost all parts of the urethra the normal color is white or yellowish white, permeated by a peculiar shade of dark red, which is most intense at and behind

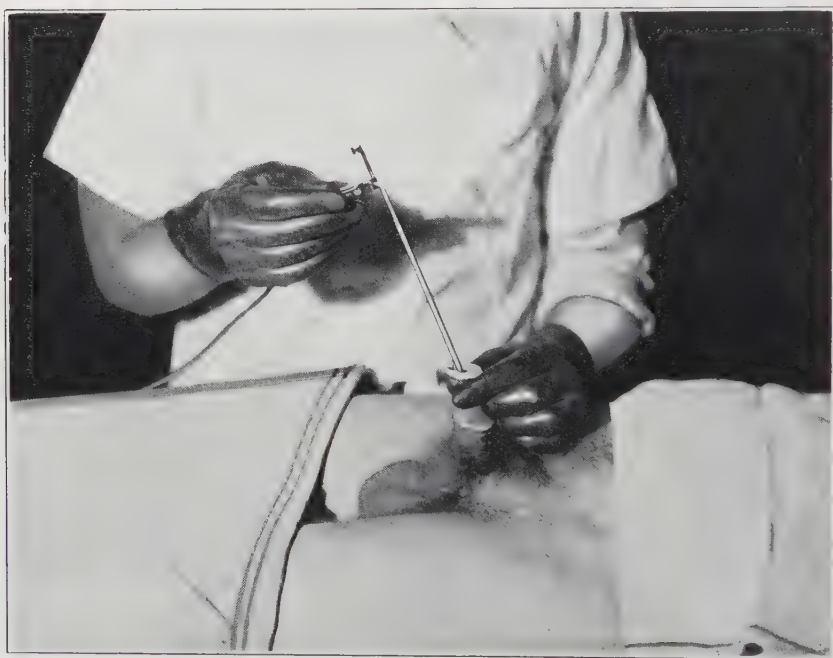


Fig. 22.—Inserting the lamp carrier into the tube.

the bulb, the color becoming lighter and lighter as the meatus is approached; in the middle of the urethra it is yellowish red in hue, while at the fossa navicularis and external orifice it is pale yellow or white.

The lustre of the normal mucosa is uniform throughout, its upper surface appearing moist, shiny and smooth.

When at rest the walls of the urethra lie in contact with one another in the form of longitudinal folds; if a tube be introduced, the folds assume a radiate arrangement, for the reason that the tube lies perpendicularly to a cross-section of the canal. The radiations vary according to the size of the instrument which

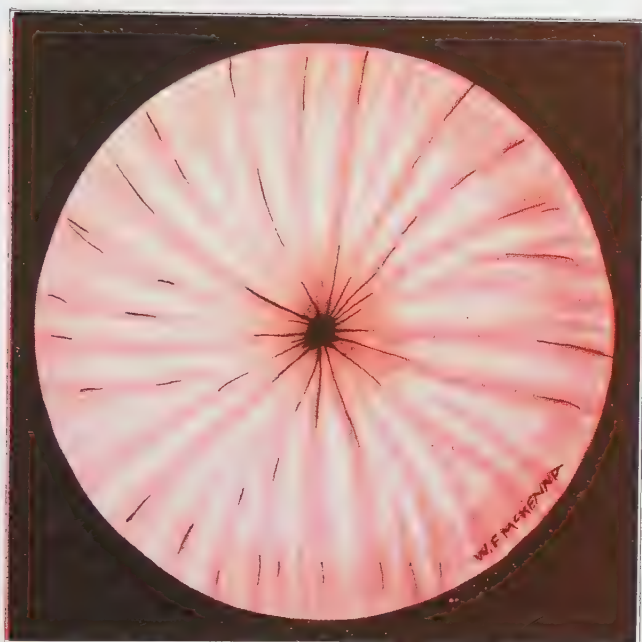


Fig. 1.—Normal urethra. (Morton.)

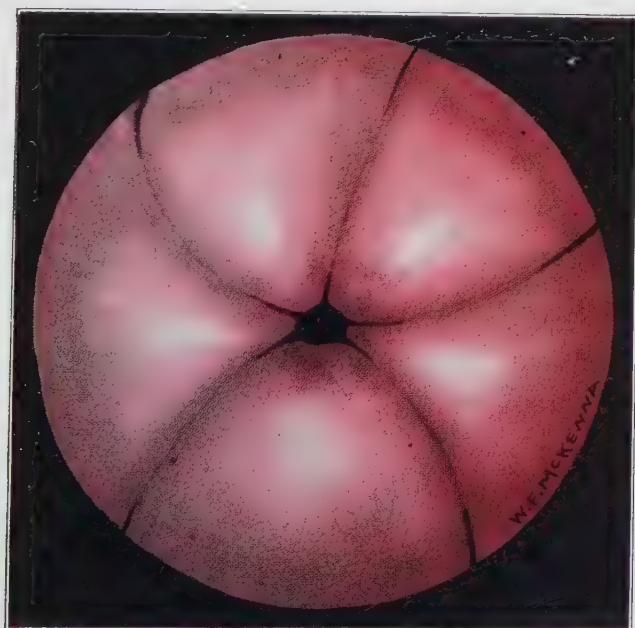


Fig. 2.—Soft infiltration. (Morton.)

is inserted; the smaller the tube, the greater the number of plications, and vice versa, as pressure of the tube against the urethra obliterates them.

In the spaces between these folds, striations varying in color from pink to deep red are seen, radiating from the periphery to the center the same as the folds themselves. The striations are caused by blood vessels in the submucosa. If the tube be pressed against one of the urethral walls, it will be easily recognized that these striations are not exactly straight lines; they may also be obliterated by central pressure.

Finally, the lacunae of Morgagni, from six to twelve in number, may be observed as fine longitudinal depressions.

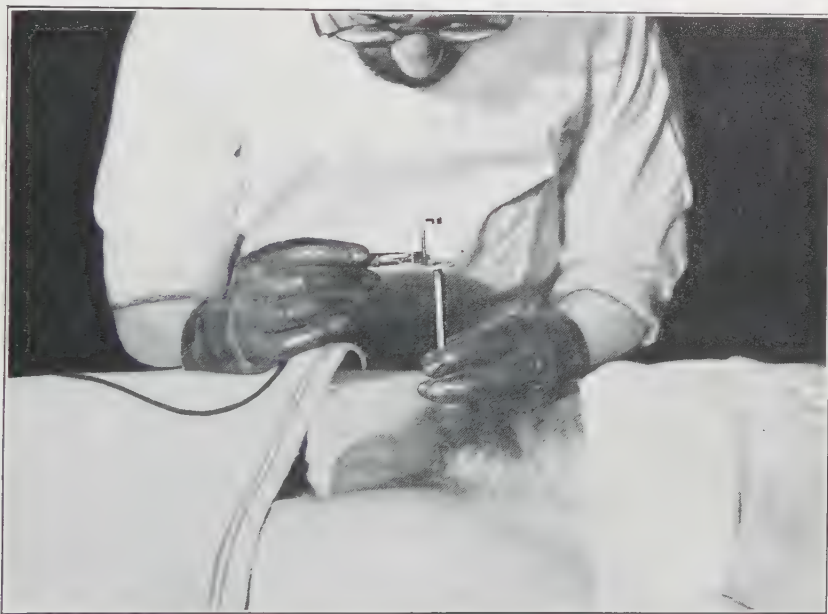


Fig. 23.—Urethroscope slowly withdrawn and mucous membrane studied.

Several forms of chronic urethritis may be differentiated by means of the urethroscope, a fact which is of some importance in regard to treatment. We have long been familiar with the sharply defined circumscribed areas of hyperemia, first described by Fürstenheim, which occur in different parts of the penile urethra, and also with the granular patches of urethritis granulosa, which are dark red or black in color, resembling those seen in trachoma.

Small celled infiltrations affect circumscribed areas of the submucosa to greater or lesser extent, sometimes penetrating as deep as the corpora cavernosa. A part of the infiltrate becomes converted into embryonic connective tissue, which in turn develops into scar tissue. As a result of the alterations the appearance of the surface becomes changed. The mucosa being poorly nourished, looks pale, and

in the worst cases has a sinewy white hue, the epithelial cells die and become stratified, as a result of which the lustre of the mucosa is lost. The thickening of the mucosa prevents the formation of folds, or at least greatly reduces their number. The striations are not so well marked and at times seem entirely wanting.

In other cases these changes are not very apparent, glandular affections dominating the urethroscopic picture. We are indebted to Oberländer for a thorough study of these glandular forms of urethritis. The infiltrate attacks Littre's glands, some of which have their orifices on the surface of the urethra, while others empty into the lacunae of Morgagni.

Under normal conditions Littre's glands cannot be seen, but when they become inflamed they show as small, round, dark red depressions about as large as the head of a pin, while Morgagni's crypts are long slit-like openings with everted, deep red edges. When pressed upon by the tube, they gape so that the point of a small sound may be pushed into them. These glandular changes are usually associated with more diffuse infiltrations of the submucous tissue. (See Plates II, III, IV, and V.)

The examination thus having been completed, we are now ready to summarize the findings and determine the nature of the lesion and its location. Briefly stated, the irrigation tests tell us whether we have an anterior or posterior infection, or both; examination per rectum, whether the prostate and seminal vesicles are involved; massage of these organs and the microscopic and cultural examination of their secretions tell us whether these organs are harboring latent bacteria and pus; the urethrometer shows the presence of stricture and infiltration, and lastly, the urethroscope shows us the actual lesions in the anterior urethra. With these data, a correct diagnosis can be made in the most obstinate case of chronic gonorrhea. We now can place the case in one of three categories,—chronic anterior, chronic posterior, or chronic anteroposterior infection.

General Management.—The hygienic and dietetic regimen imposed at the beginning of the attack is continued to the end, except in the matter of diet. It is well to allow the patient to return to his regular diet with the proviso that alcoholic and sexual irritants are interdicted. To keep a man on a restricted diet for several months is not conducive to his well-being; moreover, it has a contributory tendency to the



Fig. 1.—Hard infiltration, (Morton.)



Fig. 2.—Glandular urethritis, mixed form. Two Morgagni crypts open. One converted into closed cyst. (Morton.)

development of many of the neurasthenic conditions which appear with chronic gonorrhea.

Internally, the balsams and their modifications are useful. In cases involving the posterior urethra with urinary symptoms, it may be necessary to administer an alkaline solution in addition to the balsamic; all other internal medication is superfluous.

Chronic Anterior Gonorrhea

Symptoms.—When the anterior urethra alone is involved, the symptoms briefly may be stated as conforming in a general way with the character of a chronic inflammation in any other mucous membrane. Usually there is a complete absence of acute subjective symptoms, though there may be occasional burning pains and scalding sensations of mild type during micturition and during the course of an erection. The patient often will point a finger to a particular spot as the site of these sensations. The principal symptom is a low-grade discharge, which may be constant or occasional; usually it appears only in the morning on arising,—the familiar “morning drop.” From time to time after sexual or alcoholic excess, or at times as the result of “catching cold,” exacerbations or reinfections may occur; these may simulate an acute onset.

Pathology.—When the inflammatory process in acute urethritis has passed beneath the surface to the subepithelial connective tissues and involved the urethral glands, the healing process does not, as a rule, bring about a complete restoration of the parts to their normal condition and we have a condition of chronic urethritis. The inflammation may persist as a slow, chronic type, with or without the presence of gonococci. We thus have a chronic specific urethritis (with gonococci) or nonspecific catarrhal urethritis (without gonococci), superficial or deep seated or both, which may last for months or years and resist all forms of treatment. This catarrhal condition is dependent on the presence of a small round-celled infiltrate, localized anywhere from the meatus to the prostate, but generally involving the glands and the tissues surround-

ing them. Either the superficial or the deep tissues or both may be involved.

In advanced cases the normal cylindrical epithelia of the mucosa are replaced to a greater or lesser degree by a new deposit of partly keratinized, horny epithelium, which is extremely resistant to local treatment. In other areas there may be unhealed patches of congestion, excoriation and granulation. Usually these are found in the middle of the pendulous urethra and at the bulb. The urethral glands and follicles are widely dilated or perhaps occluded, forming many minute abscesses (*littritis* and *folliculitis*). In these follicles, the latent, attenuated gonococci and secondary organisms are particularly apt to be found, awaiting an opportunity to stir up a new infection. From these glands there may come a purulent discharge, which may constitute the only symptom and which may or may not contain gonococci. When the infiltrate is deep seated, the urethral wall is thickened and sometimes perceptibly rigid, owing to the extensive connective tissue formation. This infiltrate may interfere with the erection of the penis, to a greater or less degree. An examining instrument inserted into the urethra reveals a more or less distinct narrowing of the canal at the site of these deep-seated infiltrates, which as time passes and the scar deposit continues, becomes more and more marked and eventuates after some time into a callus or *stricture*. Fortunately all cases of chronic urethritis do not result in stricture formation, but most of them eventually do.

The pathology of *chronic posterior urethritis* is practically synonymous with that of chronic prostatitis and will be discussed under that heading.

Treatment.—Whatever the basic pathologic condition may be, if gonococci are present in the urethral secretion, the silver preparations are indicated as a most important and essential adjuvant to the general treatment. The strength of the solutions may be double that used in the acute stage, or even stronger; in other respects, their administration is identical.



Fig. 1.—Normal appearance of the urethral bulb. The central figure takes on the form of a vertical cleft; the appearance of this region is highly characteristic.



Fig. 2.—Enormous cystic gland of Littre easily destroyed through vigorous dilatations.



Fig. 3.—Soft infiltration of the urethra (typical urethroscopic aspect). The puffed up, oozing masses have an appearance similar to a mass of hemorrhoids.

PLATE IV.

(From Luys-Wolbarst.—*Cystoscopy and Urethroscopy*.)

If reaction or irritation results, the strength of the solution is diminished to that degree which readily can be tolerated without discomfort. *So long as gonococci can be demonstrated in the secretions, astringents never should be employed.* They may be used to advantage only when it is reasonably certain that we have no more gonococci to reckon with.

Vaccines, diathermy and the protein injections already referred to, have a distinct value at this stage, by increasing the body resistance and thereby aiding in the destruction of bacterial organisms.

A quite recent innovation has been the use of the silver salts, iodine, ichthyol, salicylic acid and similar substances, in an oleaginous base, preferably lanolin. Twenty-five per cent almond oil is incorporated with the lanolin so that the ointment can be put into a collapsible tube. It is claimed for this method of application, when applied to the urethra, that the oleaginous substance tends to adhere to the mucous membrane for twenty-four to thirty-six hours despite frequent urination. These substances also may be used in the form of urethral bougies.

When astringents are indicated, zinc sulphate solution, 1:200, is perhaps the most serviceable. This may be combined in various ways with other astringent or antiseptic substances. Popular astringent injections are the following:

- | | | | |
|----|----|-----------------------------|---------------|
| 1) | ℞ | Zinci sulphat. | gr. vi |
| | | Liq. plumbi subacet. dilut. | ℥ iii |
| | M. | | |
| 2) | ℞ | Zinci sulphat. | gr. vi |
| | | Bismuth subnitrat. | |
| | | Pulv. acaciae | āā 3 i |
| | | Aquae dest. | q.s. ad ℥ iii |
| | M. | | |
| 3) | ℞ | Zinci sulphat. | |
| | | Acidi carbolicī | |
| | | Alum | āā gr. iss |
| | | Aquae dest. | q.s. ad ℥ iii |
| | M. | | |

The use of thallin sulphate as an instillation, 1:200, gradually increased in strength to 10 or 12 per cent, occasionally is very effective in this stage. This is nonirritant, soothing, astringent and antiseptic. It often diminishes the inflammation and reduces the discharge in a short time.

When the inflammation is superficial in character and of slight degree, copious warm irrigations will be found better than the hand injections. Any of the silver salts or antiseptic dyes may be used in mild strength for this purpose.

Littritis and Folliculitis.—The most frequent causative factor in chronic anterior urethritis, apart from stricture, is the presence of a chronic infection of the numerous glands and follicles in the urethra. Because of the absence of definite symptoms and the relative frequency of this insidious form of infection, these glands are of the highest importance. Diagnosis is made only through the urethroscope, as already described. (See Plates IV and V.)

Treatment consists in isolating the infected follicles and treating them individually through the urethroscope. Cases which present a good "central star" usually respond quickly to treatment. When the folds are disintegrated or otherwise injured, prolonged dilatation will be required. A most efficient method of treatment is to touch up the inflamed gland orifices with a 10 per cent silver nitrate solution by means of a cotton carrier. Electricity in its various forms, ionization, fulguration with the d'Arsonval current, diathermy and many other similar methods have been devised with more or less success. The silver nitrate treatment usually is quite effective and sufficient. Alternating with these local applications, dilatation with the Kollmann dilator (Fig. 34) or a large sized steel sound is of great value. Excellent results follow massage of the penis while the sound or dilator is in the urethra. This has the effect of emptying the congested follicles of their accumulated pathogenic secretions and stimulating their blood supply.



Fig. 1.—Stricture of the urethra. Shows the pasteboard-looking appearance of the urethral walls.



Fig. 2.—Cystic and purulent Littre's glands. Looking at this picture one can readily understand the therapeutic importance of forcible dilatation, which breaks up these inflamed glands.



Fig. 3.—Morgagni's lacunae and Littre's glands chronically inflamed.

PLATE V.

(From Luys-Wolbarst.—*Cystoscopy and Urethroscopy*.)

CHAPTER IX

STRICTURE OF THE URETHRA

The simplest definition of urethral stricture is "an abnormal narrowing of the lumen of the urethral canal at any particular portion of its length, associated with a diminution of its natural dilatability" (Fig. 24). It is to be remembered that the urethra is not like a metal pipe, uniform in its dimensions from end to end, but that it varies normally within certain well-defined limits in general and in the individual (Fig. 25). A true stricture is synonymous with a pathologic change in the canal wall, characterized by the deposit of new cicatricial tissue, which, impinging on the urethral lumen, lessens its caliber and at the same time diminishes its dilatability at that point. The tendency to constant contraction is an outstanding characteristic of true stricture. (See Fig. 1, Plate III.)

Spasmodic Stricture, so-called, is a misnomer. It is not a stricture in the strict sense of the word, though it does narrow the lumen of the canal and lessens its dilatability. It is a symptomatic reflex of a distant condition and consists of an involuntary, spasmodic contraction, a contracture, rather, of the compressor urethrae muscle. This may be slight or severe enough at times to act as a complete bar to the passage of the urinary stream. The greatest care should be taken to identify this condition and differentiate it from true stricture.

Congenital Stricture is a narrowing, often seen at the urethral meatus. It may occur at the external or internal orifice of the meatus (Fig. 26) or both; though it offers no peculiar symptoms in the healthy state of the urethra, it is a frequent cause of complications and chronicity in inflammatory conditions of the urethra. When the canal is inflamed, the mucous



Fig. 24.—Stricture of the urethra. (Lowsley and Kirwin.)

membrane is highly congested and swollen; this condition, applied to the narrow meatus has the effect of closing it more or less, thus damming up the urethral secretions and contributing materially to the enhancement of the existing inflammation. The free passage of the urinary stream also is interfered with. Nevertheless, this condition cannot be classed as

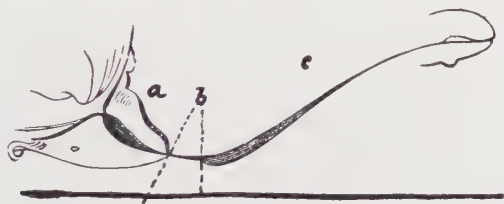


Fig. 25.—Longitudinal section of the urethra; *a*, prostatic urethra; *b*, membranous urethra; *c*, anterior or penile urethra.

a true stricture; it is merely an improper development of the meatus in embryo, acting like a stricture.

Varieties.—Strictures may be classified according to their etiology, as gonorrheal or traumatic; according to their size, as of small or large caliber; and according to location, as anterior or posterior. They also may be described according



Fig. 26.—Congenital stricture at the meatus.

to the nature of the impingement on the urinary canal as linear, annular or tortuous; also as soft, indurated or fibrous.

Etiology and Pathology.—For present purposes we may eliminate the traumatic stricture. We shall consider only that form of stricture which develops after the occurrence of

urethral gonorrhea. The frequency of gonorrheal stricture may be judged by the fact that out of 320 cases studied by Thompson, 75 per cent were caused by gonorrhea, while Martin found among 219 cases, 85 per cent that were of gonorrheal origin.

There is no doubt that urethral gonorrhea leads to the development of stricture; especially is this true when such cases are subjected to the violent passage of sounds or other instruments, or the use of irritating injections, thereby adding the element of trauma to the already existing inflammation.

The exact pathology of urethral stricture has not been altogether elucidated. At all events, it is clear that stricture following chronic urethritis "is the effect of inadequate repair of local epithelial exfoliation, and the consequent formation of a scar tissue that is progressively undergoing sclerous degeneration and contraction precisely as does the scar tissue in the repair of loss of substance of other mucous membranes or of the skin and underlying tissues destroyed by severe burns."—(Gouley.)

Bearing this scar formation in mind, we can readily see that the linear stricture is due to a duplicating sclerosis of the mucous membrane or to a thin septum of sclerotic tissue like a diaphragm; the annular form presents a ring of sclerotic tissue running transversely to the long axis of the urethra and the tortuous form is a deposit of sclerosed tissue due to an irregular contraction of the scar. The bulbous urethra is the most common site of stricture, the anterior urethra being less often involved. Sir Henry Thompson, in 320 cases of stricture, found 67 per cent of the number in the bulbous region; the remainder were found in the anterior urethra.

Usually it takes several years before a stricture begins to show evidence of its presence, though it is quite likely that its existence can be determined by examination long before its existence is suspected. The classic tendency of the stricture to contract continues in force for months and years, sometimes slowly, sometimes rapidly, until the patient begins

to realize that he is passing his urine against an obstruction. This is his first subjective intimation that a stricture has followed in the wake of his old gonococcal infection, except of course, in those cases characterized by a discharge or other symptoms.

Symptoms.—The symptoms of stricture, principally are those of the chronic urethritis which precedes and accompanies it, plus the additional symptoms produced by the obstruction of the urinary stream; that is, a chronic discharge, a sensation of pain and smarting in the urethra in connection with or apart from urination, frequent and sometimes obstructed urination and alterations in the character of the urine itself. Few strictures are unaccompanied by “gleet” or urethral “catarrh.” When sensory symptoms are present, the patient often will point to the spot where he feels the abnormal sensations; this spot usually coincides with the location of the stricture. Frequent urination also is quite commonly encountered; this is reflex and not due directly to the stricture. At times hematuria is a symptom. This is to be taken as evidence of the presence of granulations in the urethra, which in time, become converted into true scar tissue and stricture formation.

In advanced cases, the act of urination becomes increasingly difficult. At first there is simply a sense of smarting, followed by the feeling that there is an obstruction to the urinary flow, which in course of time is made evident by the narrow and thready character of the stream. This in turn is followed by the necessity of straining to get the flow through the canal; in very tight strictures, the urine can be passed only drop by drop and with considerable effort. In extreme cases there is involuntary dribbling, this being in reality due to the incontinence of chronic retention.

When the obstruction leads to retention, whether it be partial or complete, urinary changes necessarily take place. The urine becomes stagnant and decomposes, this being rapidly

followed by ammoniacal fermentation and cystitis. The entire urinary stream is now held back as if by a dam; in due course of time the prostate, bladder, ureters and kidneys are involved in the pathologic process, which, if unrelieved, ultimately may end in general septic infection and death.

Diagnosis.—The diagnosis is made by exploration. The symptoms may be suggestive of a stricture, but there are other conditions that offer similar symptoms; nothing but a direct examination can be relied upon for a correct diagnosis. This examination not only tells us of the presence or absence of the stricture, but of its location, size, character and, if more than one be present, their number.

The passage of a sound to determine the presence of a stricture in the anterior urethra should be relegated to that region



Fig. 27.—Olive tipped bougies.

to which all discarded therapeutics go, except in suspected strictures of the deep urethra, when a blunt-pointed sound may be used.

For the bulbous and anterior urethra, the Otis urethrometer is employed, or, in its absence, the olivary pointed bougie of metal or silk web (Fig. 27). A full set of these instruments is required. A bougie, No. 29 French, should be used first; if this passes down to the bulb and back to the meatus without obstruction we may be sure there is no marked stricture in the anterior urethra.

If the bougie meets with resistance at any particular point, we make note of the distance between that point and the external urinary meatus. This furnishes a guide to the location of the stricture. We then repeat the examination with gradually diminished sizes until one is reached that will pass be-

yond the stricture down to the bulb and return to the meatus without being obstructed. We now know the number of strictures, their size, character, and location.

If the meatus urinarius is too small to admit of the passage of the largest size bougie, there is no other recourse than to perform a meatotomy, cutting well up to 32 French, so as to allow for subsequent contraction to 28 or 29.

The necessity of slitting open the meatus and using a number of instruments with increased risk of infection and damage, is obviated by the employment of the Otis urethrometer (Fig. 17). With this ingenious instrument the largest as well as the small calibered stricture can be identified. When closed it can be passed through a No. 15 French meatus and can be dilated up to 45 French. Its dilated bulb is covered with a thin rubber cap, made specially for this purpose, the whole being sterilized in hot water. The method of procedure is simple. Before inserting the instrument, the bulb should be rather forcibly dilated up to the maximum degree (45 French), to see that that rubber cap, is sound and dilatable. The bulb is closed, its rubber-capped tip lubricated and gently inserted into the urethra down to the lower urethra. The bulb now is dilated to 29 or 30 French. Occasionally it is advisable to dilate as high as 33 or 35 French; by so doing, incipient strictures can be discovered which otherwise might have gone unobserved. The instrument now is slowly brought toward the meatus and any obstruction or tender areas located and noted.

If the instrument catches against a stricture and cannot be gently coaxed through it, its bulb should be reduced by one number or as many as are found necessary to effect the passage; a note is then made of the distance of the obstruction from the meatus and the largest number that will pass through it. This is repeated at each point of interference. The instrument finally is withdrawn and the canal cleansed with an antiseptic solution. Notice also should be taken of

any bleeding that might follow; this points to the presence of granulating areas.

Another method of determining the presence of a tight stricture is by the use of the urethroscope. The tube is brought down to the stricture and the orifice carefully located. In most cases this orifice is readily discovered. A filiform is introduced into the orifice, after which the urethroscopic tube is carefully withdrawn, leaving the filiform in place.

Prognosis.—In the strict sense of the word, stricture cannot be cured. Once a stricture, always a stricture. The pathologic factor responsible for the organic changes in the urethral wall may be removed; the dilatability of the canal may be restored for the time being; but the intrinsic damage to the canal wall is permanent and cannot be retrieved. The infiltration in the urethral wall constitutes a permanent, organic change and we cannot hope by any means at command, even with the aid of the knife, to eradicate it. Therefore, while stricture may be cured in a clinical sense,—in the sense that we restore the parts to their normal functional state, there still remain the structural changes that gave rise to the clinical symptoms of the disease, together with the constant tendency to recontraction. The most we can hope for is a restoration of the natural lumen and dilatability of the canal and the removal of the symptomatic evidences of the disease. This constitutes a “cure,” but the patient should be warned that the stricture may and in all probability will return in due course of time unless prophylactic measures are taken to prevent this occurrence. These measures are simple enough, but they rarely are followed out to the end. After the patient has been declared cured, the urethra must be dilated at increasing intervals, under aseptic conditions, until an interval of three or four months has been reached. From that time hence, for the rest of his life, the patient should have the urethra dilated at least two or three times each year. In this way and only in this way can the recurrence of his stricture be prevented.

It goes without saying that this prophylaxis also includes a warning against renewed gonococcal infection. He should be warned that every new attack of gonorrhea will aggravate the old lesion and may set up a reaction that may lead to the reappearance of the old stricture as well as the formation of new ones.

Treatment.—The treatment of stricture essentially is mechanical. In a few words, the sole requirement is to dilate the stricture with the *minimum degree of trauma*, to such an extent that it shall not obtrude on the normal lumen of the urethral canal. In addition, the general and local pathologic conditions presented by the patient should receive attention. The coexisting “gleet,” reflex pains and aches, urinary disturbances, psychoses and all other abnormal manifestations should be treated. Nevertheless, we should not lose sight of the fact that the primary indication is to restore the lumen of the canal as nearly as possible to its previous normal state and keep it fully dilated. The patient may be considered cured, if there is no evidence of recontraction when dilatation is performed at semiannual intervals. If there is no contraindication for other reasons, there is no prohibition against marriage in the mere presence of a stricture. But the dilatation must be continued throughout life, whether or not marriage has taken place,—not as treatment, but as a prophylactic and insurance against possible recontraction, which is almost sure to occur if dilatation is suspended for a long time.

Naturally, there is no single method of treatment applicable to all cases of stricture. Each case should receive treatment according to the extent and character of the existing lesion. Generally, strictures at or very near the urinary meatus require incision, because they do not dilate well and stretching is very painful in this region. For the rest of the pendulous canal, dilatation is all that is necessary, except in certain resistant and nondilatable strictures. These must be cut. If they are situated in the anterior urethra, that is, within five

inches of the urinary meatus, by internal urethrotomy; in the deep urethra, by perineal section and external urethrotomy. All cutting operations must be followed by long-continued administration of large sounds. Strictures in the perineal region do not respond kindly, as a rule, to dilatation. These strictures should be cut and kept dilated with large sounds.

Dilatation by Sound.—For the average stricture, the steel sound serves admirably. The instrument should have the proper curve (Fig. 28). Unless there is good reason for haste,



Fig. 28.—Steel urethral sound.

the dilatation should be gradual and continuous. Rapid dilatation usually is followed by severe reaction, which often results ultimately in more harm than good. For strictures of smaller caliber than 20 French, flexible bougies should be used (Fig. 29). Steel sounds are dangerous weapons, capable of perpetrating an untold amount of damage; even in the hands of the expert they are not altogether safe.



Fig. 29.—Flexible bougies.

How often the sound should be used, how long it is to be retained in the canal and how deeply it is to be inserted, depend upon the individual case and should be determined by the judgment and experience of the practitioner. In very tight and resistant stricture, dilatation may be done advantageously every day, but when it has been stretched up to 23 or 24 French, dilatation should be done on alternate days or at greater intervals, the instruments being retained in the

urethra five to ten minutes. It may not be amiss to repeat that it is essential to inject one of the silver salt solutions and retain it in the urethra for ten minutes, before the introduction of the sound. If it is certain that there are no deep-seated infiltrations or strictures, the sound is inserted in the anterior urethra alone. On the other hand, when large-sized sounds are being used, it will be found advantageous to pass the instrument into the bladder.

Strict asepsis is a *sine qua non* to the successful treatment of stricture. Steel sounds are best sterilized by boiling. Soft instruments need not be boiled; the cheaper grades cannot be boiled. Plenty of soap and warm water will cleanse them thoroughly. All instruments should be cooled before they are inserted. The surgeon's hands should, of course, be clean, the glans and meatus of the patient likewise; the removal of the instruments should be followed by a cleansing irrigation of the urethra. These measures will prevent any untoward results. A nonirritating and sterile lubricant also is essential. Glycerin is apt to prove irritating and it is also difficult to keep sterile. Ointments do not lubricate. The best medium is one of the Irish moss preparations that are on the market. These preparations come in collapsible vials, they can be kept sterile, do not irritate and are always fresh and clean.

Another cardinal requisite is *gentleness* combined with patience. A sound never should be *driven* through a stricture by force. The dilating sound should be just a little larger in diameter than the lumen of the canal at the point of stricture; the small amount of force necessary for the sound to pass the stricture will be afforded by the weight of the instrument, combined with the resilient tendency of the stricture. At most, all that is necessary is to hold the point of the instrument firmly and patiently against the orifice of the stricture; the operator's patience and gentle persistence will be rewarded when the stricture will suddenly open, admit the sound and close upon it with a firm grasp. Very often this is so tight that considerable force is required to with-

draw the instrument—much more than is ever permissible or necessary for its insertion.

The interval between the passing of the sounds gradually should be increased; when an instrument of 28 or 29 French caliber can be accepted, once a week is quite sufficient. This interval should be increased gradually until we are certain that the stricture shows no immediate tendency to recontraction. From that time on, the prophylactic passing of the sound several times a year should be begun and continued during the entire life of the patient; otherwise a recurrence is to be expected.

Thermic Dilatation is a quite recent combination of diathermy and dilatation. After passing a high frequency current into the urethra through a metal sound, the urethra

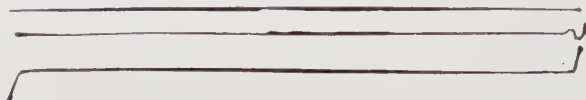


Fig. 30.—Whalebone filiform bougies, with straight and bent tips.

is dilated to the point desired by a large sound or a Kollmann dilator. By this combined method, cutting operations in obstinate cases are avoided, gonococci and other bacterial organisms are destroyed, infectious complications are prevented and in the case of filiform strictures, successful dilatation generally results.

The Filiform Bougie.—For strictures that are so tight as to prohibit the passage of small-calibered soft sounds we must resort to the use of the filiform bougie. The whalebone filiform bougies are the best and most serviceable. The greatest care is to be taken lest the fine point of these instruments enter one of the lacunae or one of the numerous follicles or false passages in the canal. A false passage can be made very easily with these fine instruments, but this need not occur if due care is exercised. At times, it is well to bend the tip (Fig. 30); the instrument thereby

often will avoid false passages and wide-mouthed lacunae and engage the stricture directly. These instruments are employed until the stricture has been dilated sufficiently to admit flexible bougies, which in turn are followed by the steel sounds.

When it is found that the tip of the filiform cannot be made to enter the orifice of the stricture, it is well to fill the urethra with warm sterile oil or lubricant and pass a number of filiforms down to the stricture in rapid succession, thus filling up all the space surrounding it. Then they are manipulated one after another, until one of them will engage the stricture; this one can be made to enter without further trouble. It is retained and the others withdrawn. The procedure is greatly facilitated by filling the urethra with sterile olive oil. This separates and lubricates the urethral walls and guides the distal end of the filiform towards the stricture orifice. By this method it is unusual to fail in passing even the finest strictures.

If the filiform cannot be passed, in spite of this method, it is desirable to insert a urethroscopic tube down to the stricture and with the aid of the light inside of the tube, the stricture orifice may be identified and the filiform inserted. The tube and light carrier then are withdrawn leaving the filiform in the stricture orifice.

The le Fort filiform is extremely useful in these cases (Fig. 31). It consists of a filiform threaded at one end, which can be attached to a metal or rubber catheter of varying size with a corresponding thread at its curved and narrowed end. The filiform having passed through the stricture into the bladder, the metal catheter is screwed on and both the filiform and catheter following it are pushed into the bladder, thus dilating the stricture. After a few moments the catheter is withdrawn, a larger size catheter is attached to the filiform and the bladder irrigated, after which the filiform is withdrawn and the solution is voided per urethram. In this



Fig. 31.—LeFort filiform.

way gradual dilatation is continued up to the point at which a fairly large sound can be introduced without the use of a filiform.

Small Meatus.—When the meatus urinarius is so small that a fairly large-sized sound (27 French) will not pass through comfortably, the meatus must be enlarged (meatotomy). I prefer to use the Kollman dilator instead of the sound. Nothing is gained by forcing large sounds through a tight meatus. The net result is the causation of additional trauma and the infliction of considerable unnecessary pain on



Fig. 32.—Oberländer anterior urethral dilator.

the patient. Meatotomy can be done painlessly in a few moments and the annoyance during healing is far less than the tortures inflicted by jamming a large sound through the clinging meatus. If meatotomy is objected to, the Kollmann dilator must be employed for dilatation.

Urethral Dilators.—These ingenious instruments are constructed so that they pass through a small meatus (16



Fig. 33.—Oberländer posterior urethral dilator.

French) and are dilatable up to 45 French. The dilating portion is covered with a thin rubber sheath made for the purpose to avoid injury to the mucosa. The simplest of these instruments is the Oberländer dilator, which dilates in the perpendicular plane only, the patient lying on his back. The anterior dilator (Fig. 32) is a short, straight instrument, while the posterior dilator (Fig. 33) is curved to resemble the



Fig. 34.—Kollmann anterior urethral dilator.



Fig. 35.—Kollmann posterior urethral dilator.

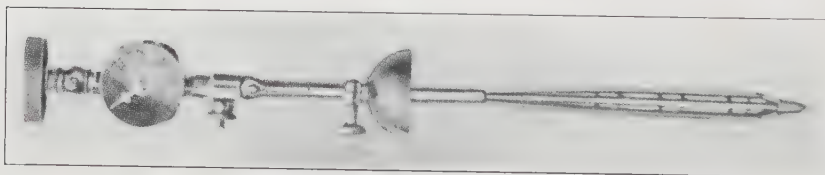


Fig. 36.—Kollmann anterior irrigating urethral dilator.

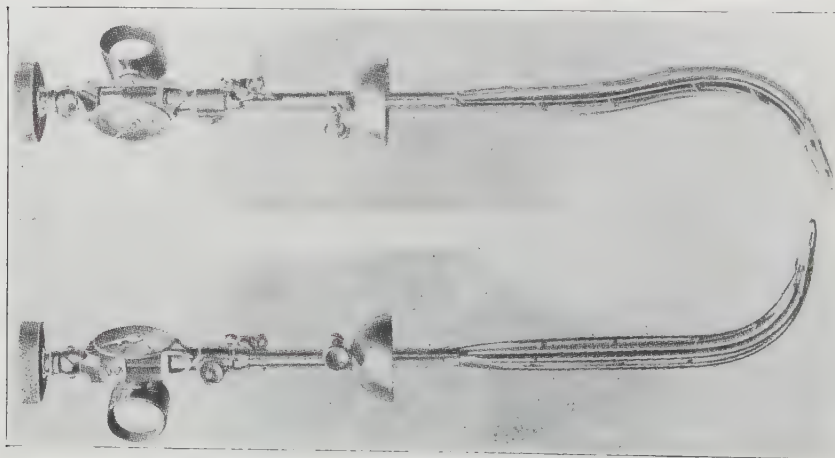


Fig. 37.—Kollmann posterior irrigating urethral dilator.

urethral sound. The Kollmann instrument dilates in two planes; that is, it has four arms instead of two and because of that fact is a much more useful instrument. This, too, has an anterior (Fig. 34) and a posterior (Fig. 35) model. The Kollmann dilator has been modified to include an irrigating apparatus, thus permitting of the irrigation of the canal simultaneously with its dilatation. The irrigating dilator also has an anterior (Fig. 36) and a posterior (Fig. 37) model.

In certain cases in which the meatus is dilatable but contracts quickly, it is sometimes well to use the double taper sound (Fig. 38). The illustration shows the dimensions at the tip, shank and handle. It will be observed that once the largest diameter has passed the meatus, the shank is re-



Fig. 38.—Double taper urethral sound.

duced in diameter and the meatus is spared the dilatation that is administered to the canal proper.

Forcible Dilatation.—This method of stretching a stricture at one sitting is to be condemned, except in unusual cases where great rapidity in dilatation is the essential desideratum. The dilators are the best instruments for this purpose. The process usually is accompanied by severe pain and extensive hemorrhage, often followed by marked shock and urethral fever. This method rarely is used in practice.

Cauterization.—In the past the cauterization of strictures was extensively practiced, on the theory that excessive granulations constituted the stricture. The most popular media for this purpose were silver nitrate and caustic potash. These were applied by means of special instruments devised for the purpose. The method is now obsolete.

Electrolysis.—Favorable results have been reported by this method of treatment, but it has not commended itself sufficiently to replace the well-established method of simple dilatation by sounds.

Cutting Operations for Stricture

Urethrotomy, or cutting through the stricture, is the last resort in the treatment of this condition; it should be done only when dilatation cannot be employed with success. As a rule, most strictures in the penile portion of the urethra can be cured by gradual dilatation, the method of preference; but in other portions of the canal, such as the deep urethra and the balanic portion, the cutting operations are to be preferred.

At the Meatus.—For stricture at the meatus, dilatation is of little or no value; here the operation of meatotomy is indicated. These meatal strictures are quite common (Fig. 26). Most often they are congenital, but many are due to gonorrhea and to trauma. Occasionally a chaneroid or chancre at the meatus leaves behind a distinct stenosis of the fossa navicularis, which may be rebellious to treatment by dilatation.

The narrowing may be found at the anterior meatus, the posterior meatus or in the fossa between the two. It can be determined only by means of the Otis urethrometer or the bulbous bougie. The sound does not aid in diagnosing this condition, for it may pass through without giving the slightest evidence of the existence of the narrowing.

Any meatus that does not admit readily a bulbous bougie, size 25 French, may be said to be stenosed. This does not necessarily mean that a meatotomy is immediately necessary; it does mean, however, that a prolonged and apparently incurable anterior urethritis may be continued and prolonged by the meatal stenosis. It is more than possible that the pains and other sensations felt by the patient at or near the meatus may be and usually are due to the existence

of this contraction. It is furthermore impossible to introduce a large-sized sound for the treatment of stricture further back in the urethra. For all of these conditions, incision of the stenosis (meatotomy) is required and often will accomplish what no other method of treatment has been able to do, especially in cases with a neurotic background.

Meatotomy.—This operation is a very simple one, but it is done often in such a manner as to leave the patient no better off than before it was done. In the first place, the incision is made not big enough. When the incision is freshly made, the meatus should be able to admit a bougie, at least 31 or 32 French, comfortably. It will contract to 28 or 29 French in a short time. This is the maximum size required for the treatment of stricture in the penile urethra and for drainage purposes.

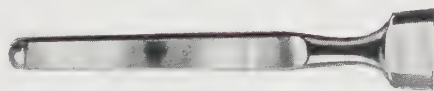


Fig. 39.—Blunt-pointed bistoury.

A second fault is the failure to cut the stenosis at the posterior meatus. It is not sufficient that the external meatus has been enlarged. The bougie should be passed through the second meatus; if it catches in the slightest degree, the incision must be carried backward to include the internal as well as the external meatus.

A third fault sometimes is observed in the steadfast adherence to the rule, always to cut toward the frenum. When the meatus already reaches very near the frenum, any further incision in the same direction creates an artificial hypospadias. This can be avoided, in these cases, by incising the meatus upward and avoiding the urethral floor as much as possible. With these three possible errors in mind, the operation is sure to attain successful results.

A straight bistoury with a blunt point is the best cutting instrument for this purpose (Fig. 39). Some surgeons do

the operation without a local anesthetic. This, however, is an unnecessary cruelty to the patient, for the analgesia can be made absolute with very slight effort. It is better to inject a few drops of $\frac{1}{2}$ per cent alypin or procaine solution into the tissue near the meatus.

A soft rubber catheter is clamped about the root of the penis to control any possible bleeding. The bistoury is now inserted as far back as deemed necessary to incise both the anterior and posterior meati up to 32 French, as tested by the bulbous bougie. A large-sized straight sound (female type) is inserted for two or three inches to be sure that it enters the canal freely. Two horsehair or fine silk sutures bring the skin and mucous membrane together, thus insuring more rapid healing with a minimum of bleeding. The clamped catheter is released. The meatus now is lightly packed with a fine pledget of cotton; a tight bandage completes the operation.

The patient is instructed to insert a fresh pledget of cotton moistened in an antiseptic solution after each urination for several days. The large sound is passed on alternate days until complete healing has taken place. If much bleeding occurs, which is rare, it is readily controlled by a tight bandage. It is well to remember that the presence of an urethral discharge is not a contraindication to meatotomy. To the contrary, it provides better drainage for the inflamed canal and often aids materially in the improvement of the basic pathology underlying the urethritis.

Operations on the Penile Urethra.—In this portion of the urinary canal gradual dilatation is the method par excellence, but not infrequently we encounter cases that are refractory to the highest degree. They can be torn, but they simply refuse to dilate or stay dilated. In these cases, a cutting operation is required; likewise, in those instances in which rapid dilatation is desired in a stricture with a small caliber and a tendency to obstinacy.

The purpose of the operation is to divide the scar tissue or callus and separate the divided edges so that a new deposit of scar tissue may become interposed and thereby widen the lumen of the canal at that particular point. After the stricture has been cut to the desired degree, it is kept dilated by the constant and persistent use of steel sounds or the Kollmann dilator.

The instruments used for this purpose are of the antegrade (cutting from before backward) and retrograde (cutting from behind forward) varieties. The Maisonneuve (Fig. 40)

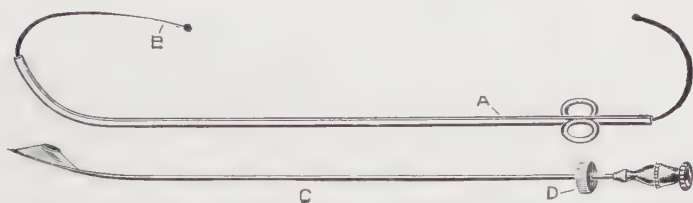


Fig. 40.—Maisonneuve urethrotome.



Fig. 41.—Otis urethrotome.

is the most popular instrument of the former type, and the Otis (Fig. 41) is the most commonly used of the latter type.

The Maisonneuve has the advantage of being able to cut a stricture so small as to admit only a filiform bougie. A serious objection to this instrument is that it is capable of cutting the deep urethra, as the knife is so arranged that it can be carried down to the internal sphincter. This apparent advantage is dangerous, in that it encourages infection and permits of severe and hazardous concealed hemorrhage, which may be beyond control. There may be no hemorrhage at the meatus; this is altogether misleading, for the bleeding

may be profuse into the bladder. A catheter inserted into the viscus, into which blood is flowing, proves the existence of deep-seated hemorrhage. The best and practically the only method for the control of this deep bleeding is by a perineal section (external urethrotomy) and the application of pressure or tying the vessels, if they can be reached through the opened urethra.

In this country the most popular instrument for the division of stricture in the pendulous urethra is the Otis urethrotome. With this instrument the stricture is dilated up to the desired point and then the knife is passed through, cutting the stricture and any other tissues with which it comes in contact.

This instrument cannot be used in strictures whose caliber is less than 14 French. This disadvantage is overcome by passing filiforms, whalebone bougies and silk woven bougies, up to the point when the urethrotome can be passed through the orifice of the stricture.

For two days previous to the operation, it is well to prepare the patient by the administration of one of the urinary antiseptics. Methenamine and salol are the most reliable for this purpose. General anesthesia is not necessary. The operation can be done painlessly, the anterior urethra being filled with a 2 per cent solution of alypin or procaine and held there by the patient or by means of a urethral clamp for five minutes. Cocaine *never* should be used in the urethra.

The canal should be thoroughly irrigated before cutting; in the presence of acute inflammation, of course, any operation is out of the question. There are certain rules that should be rigidly adhered to, principally the following: All cutting must be done on the roof of the urethra, for anatomic reasons; the instrument should be dilated up to 31 or 32 French and the knife drawn forward and out of the meatus, cutting any strictures present and the meatus as well, up to the point of dilatation; one cut usually is sufficient. After the

cutting is completed, the urethra and bladder are irrigated with warm sterile solution, a full-sized sound is passed, never into the deep urethra, and retained for a minute or two. This controls the bleeding. The bladder now is emptied and the operation is complete.

Some surgeons tie a catheter in the urethra and keep it there for a day or two to insure bladder drainage and divert the urinary stream.

The catheter usually acts as a foreign body in the urethra, often giving rise to acute nonspecific urethritis. Besides, it does not accomplish the purpose for which it is employed—namely, to prevent the urine from coming into contact with the wound in the urethral canal. The urine manages to get outside the catheter in spite of all precautions. However, if urethral irrigation is persisted in and a good urinary antiseptic like methenamine, salol, or helmitol is administered internally, there is slight danger of urethral fever or other complications.

Sounds should not be passed for three or four days after the operation; thereafter they should be passed on alternate days, to keep the wound open. When the withdrawal of the sound no longer is followed by hemorrhage, we may feel certain the wound has healed; from that time on, sounds should be passed at greater and increasingly greater intervals to prevent recontraction.

Immediately after the operation it is wise to apply pressure to the wound, by applying a splint to the penis (Fig. 42). On either side of the penis a splint of cardboard or thin wood is applied, the outer skin of the organ being well protected with absorbent cotton. The splints are held in place by adhesive plaster strips. The splint is covered with a tight bandage. It is important before leaving the patient to see that he can void his urine; for in this way we know whether or not the splint has been applied too tight to permit the passage of the urinary stream.

Secondary hemorrhage following internal urethrotomy is not rare, especially when frequent erections occur. If the cutting has been done within five inches of the urinary meatus, blood will appear at the meatus. If the incision is further back than five inches, the hemorrhage may be concealed and may cause considerable damage before it is learned that blood is flowing into the bladder. It is therefore a good rule never to do an internal urethrotomy unless the stricture is situated

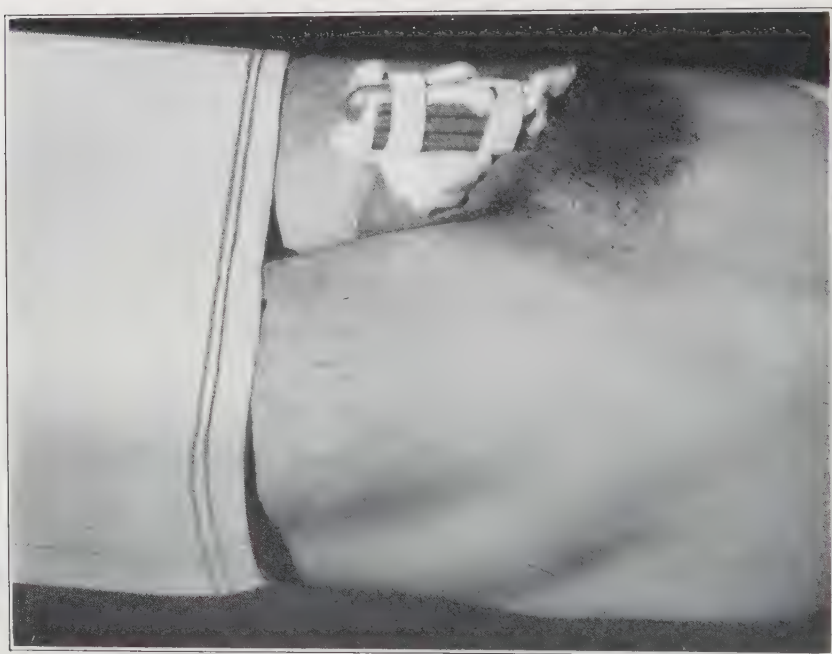


Fig. 42.—Splint applied to the penis after internal urethrotomy.

in the anterior urethra, so that any secondary hemorrhage may be detected quickly.

Secondary hemorrhage is best arrested by inserting a catheter or hollow metal sound into the bladder and applying pressure around the penis. A T-bandage may be applied very tightly, with a pad over the perineum and the penis, the latter resting on the pubic symphysis. It is well to keep the

patient in bed for a day or two after the operation, if there is any fear of hemorrhage.

External Urethrotomy.—This procedure is indicated in those cases of stricture of the bulbous urethra which are resistant to dilatation or which are not dense enough to require absolute excision and resection. It has the great advantage of holding any possible hemorrhage under direct control and gives opportunity for excellent drainage, thus reducing by far the likelihood of septic infection. Its only alternative is the operation of internal urethrotomy with the Maisonneuve urethrotome, but its advantages are so strongly obvious that it has become the classic operation for deep-seated strictures. It is also the operation *par excellence* for periurethral abscess, prostatic abscess, urinary extravasation and allied conditions involving the perineal region.

It is not necessary to go into the details of the operation. They can be found, fully described, in any surgical textbook.

The aftertreatment is important. Some surgeons permit a urethral catheter to remain *in situ* for several days. Better results, however, will follow if, instead of the catheter *à demeure*, a large-sized perineal tube is used. This will be found much safer from every point of view and more pleasant for the patient. The bladder is washed out freely through this large tube at the close of the operation, with hot sterile water or boric solution. If there is much hemorrhage it may be controlled by irrigating with hot adrenalin solution, 1:10,000, or 1:5000 silver nitrate solution. Packing the perineal wound around the drainage tube also is effective, particularly if the gauze carries with it a liberal amount of glutol. A T-bandage holds the dressing in place and contributes a fair amount of pressure as well.

Perineal urethrotomy without a guide is a difficult surgical procedure. The surgeon feels his way, so to speak, and must trust to his skill and luck to find the opening of the stricture.

One rule always should be borne in mind; that is, to keep as close to the roof of the urethra as possible without cutting into it, until the stricture has been found and divided. Once the stricture is found and divided, the drainage tube and other procedures above-mentioned are used in the same way.

The drainage tube is kept in place four or five days, but particular pains must be taken to see that the bladder is being drained properly. The tube is connected with a long narrow rubber tube, which leads into a bottle or urinal. The latter may be kept clean by placing in it a quantity of 2 per cent solution of phenol. Irrigation of the bladder should be done once or twice daily. A weak dye or silver nitrate solution (1:10,000) should be used for the purpose—the latter particularly, if cystitis be present. After the drainage tube is removed, the wound is kept surgically clean and a dry dressing is applied. Simultaneously a large-sized sound is introduced into the bladder and the procedure is repeated every three days, until the wound is healed. The urine is passed through the perineal wound for the first few days, but after a week or thereabouts the wound shows signs of closing and the patient passes urine voluntarily, partly through the perineal opening and partly through the urethra. Within a week thereafter the urine is passed normally, except in the presence of a perineal fistula.

Resection.—In continental Europe this operation has attained some degree of popularity, especially in France. The operation is indicated only in those rare cases of stricture in the deep urethra in which there are such very dense and firm masses of scar tissue that other methods of treatment, including external urethrotomy, are found to be useless. Most of these cases are the result of severe trauma, causing extensive laceration and followed by a correspondingly large deposit of fibrous connective tissue. Such a stricture sometimes may follow extensive trauma of the anterior urethra.

The operation consists of a complete excision of the wall of the urethra containing the new deposit and a suturing of

the cut edges. Usually this is done over a catheter *à demeure*, which is kept in place for a week or two, until union is fairly complete. This is a radical operation and should be done only as a last resort.

MacGowan recently described a technic for use in cases prepared for excision of stricture. A suprapubic cystotomy is performed and bladder drainage maintained for one or two weeks. As a result of this procedure, with the relief of the back pressure of the septic urine, the periurethral infiltration may soften gradually and disappear to such an extent that what was considered an impassable stricture may become amenable to dilatation, thereby rendering excision unnecessary. Excellent results have been recorded in support of this technic.

CHAPTER X

CHRONIC POSTERIOR GONORRHEA

In considering the chronic infections of the posterior urethra and its adnexa, it is essential to remember that the inflammation generally involves all the organs comprising the lower genital tract,—that is, the verumontanum, prostate, seminal vesicles and the posterior urethral floor, walls and roof. Even the vesical sphincter is not immune to invasion. It is consequently difficult and impractical to draw a fine line between these respective organs, since they all seem to be affected to a greater or lesser degree. In some cases, one particular organ, the prostate, for instance, shows the most marked evidence of the infection; in other cases, the seminal vesicles; in still others, the verumontanum alone or the urethral floor adjacent to it, seems to have borne the brunt of the inflammatory process. At all events, it is safe to assume that all of the organs have partaken in the infection.

Complement-Fixation Test.—In chronic cases with an obscure history of gonococcal infection, in which a reasonable doubt exists as to the character of the infection, a most valuable aid in the diagnosis is offered by the complement-fixation test, particularly in the presence of complications. An excellent summary of the practical value of this test in chronic gonorrhea has been given by Williams, as follows:*

To be of much practical value, the gonococcus complement-fixation test must be conducted with a polyvalent antigen and the hemolytic indicators must be carefully adjusted and repeatedly titrated. The test is absolutely specific for the gonococcus. In no infection other than gonococcal, has a positive reaction been obtained. Thus, it is more specific than the Wassermann test is for syphilis.

A positive reaction is always reliable and an indication of a gonococcal infection somewhere in the body. The only exceptions are when the serum is obtained from an individual who has recently received gonococcic vaccine or has

*Morton: Genito-Urinary Diseases and Syphilis, 5th Edition, page 180.

just recovered from a gonorrheal infection and the immune bodies have not been eliminated a variable length of time, but probably not exceeding two months.

The test is of particular value in suspected gonococcal infections in which the gonococcus cannot be discovered bacteriologically. In doubtful cases, the only proof of a specific infection is the cultivation of the gonococcus. As a matter of technic, the acquiring of the gonococcus in culture, owing to its susceptibility to cooling, its association with other rapidly growing organisms, and the need of special media, is much more difficult than the fixation test. Except in acute cases, where the gonococci are abundant, the positive evidence produced by a gram-stained smear should not be accepted as conclusive. Among the sources of error may be mentioned the *Micrococcus catarrhalis*, the *Diplococcus crassus*, irregular types of gram-negative cocci, and most important of all are the so-called degeneration forms of staphylococci.

In interpreting a positive test, it should always be borne in mind that gonorrhea is a very widespread disease and that individuals may suffer from at least two different infections. A positive reaction occurring in a patient supposedly cured of gonorrhea, indicates the presence of a gonococcal focus and the capability of infecting others. The importance of this in connection with marriage is great. A positive reaction occurs in 20 per cent of those clinically cured. In a few cases, in which the gonococci are usually easily demonstrated, the test is generally negative. Contrarily, in the chronic and ill-defined affections, where it is not usually feasible to obtain the organism, the test acquires its greatest sensitiveness. A negative reaction does not exclude gonococcal infection, especially in the acute and subacute stages, without complications, when it is limited to the urethra or vagina.

Syphilis or a positive Wassermann reaction does not interfere with the test in any manner.

It is of particular value in the diagnosis of gonorrheal arthritis, giving about 100 per cent positive reactions.

Gonorrheal epididymitis, at least by the fifth week, also gives about 100 per cent positive reactions.

Chronic posterior urethritis, prostatitis and seminal vesiculitis, with recurrent exacerbations, give about 75 per cent positive reactions.

Pyosalpingitis gives about 55 per cent positive reactions. About 65 per cent of all stricture cases give positive reactions.

Inflammation of the Verumontanum: Colliculitis.—Until this little organ, situated on the floor of the posterior urethra, was revealed to the naked eye through the perfection of the modern urethroscope, comparatively little was known about it and its pathology. Within the past decade, however, we have learned that the verumontanum invariably is affected, more or less seriously, in practically all chronic posterior infections,

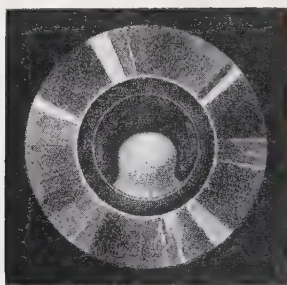


Fig. 43.

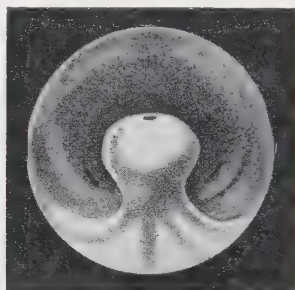


Fig. 44.

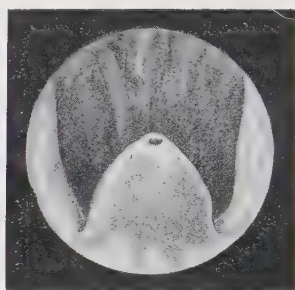


Fig. 45.



Fig. 46.

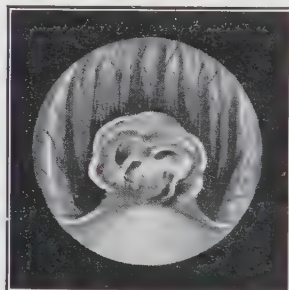


Fig. 47.

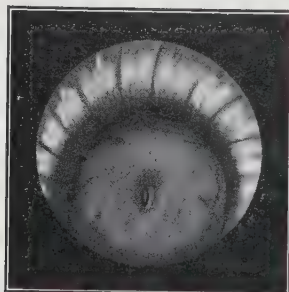


Fig. 48.

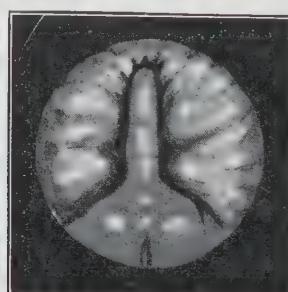


Fig. 49.

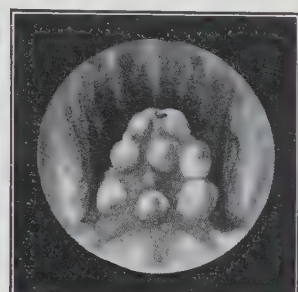


Fig. 50.

Fig. 43.—Verumontanum seen with simple straight or curved tube.

Fig. 44.—Verumontanum, same as Fig. 43, seen through improved cystourethroscope.

Fig. 45.—Dome-shaped verumontanum with utricle at apex.

Fig. 46.—Verumontanum with flat top; utricle on anterior aspect, ejaculatory ducts in lateral sulci.

Fig. 47.—Fungus-shaped verumontanum. (Wossidlo.)

Fig. 48.—Hypertrophied verumontanum (Luys).

Fig. 49.—Phallus-shaped polyp arising from apex of verumontanum.

Fig. 50.—Verumontanum covered with cysts.

Fig. 51.—Large verumontanum covered with papillomata. (Wossidlo.)

Fig. 52.—Pointed verumontanum with multiple cysts dependent from urethral roof.

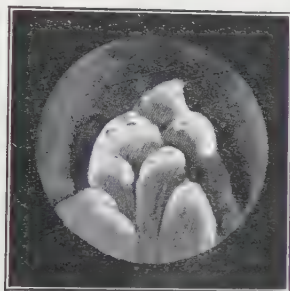


Fig. 51.

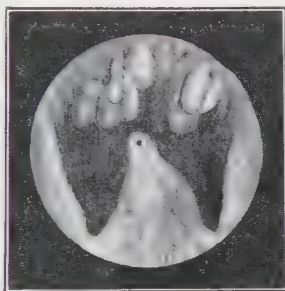


Fig. 52.



Fig. 53.

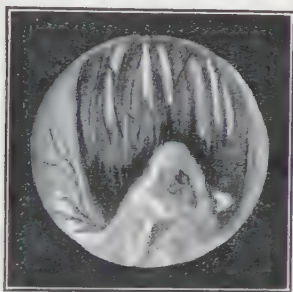


Fig. 54.

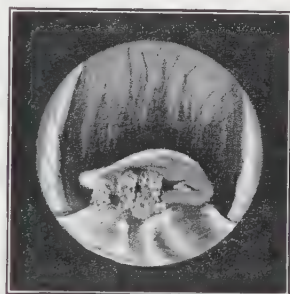


Fig. 55.

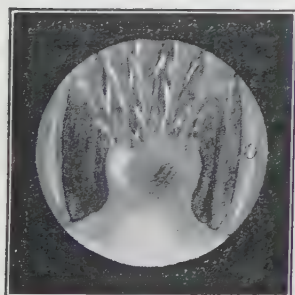


Fig. 56.

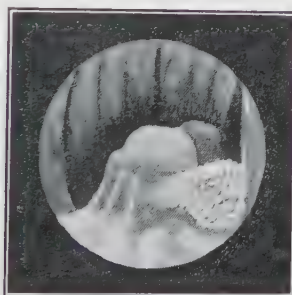


Fig. 57.

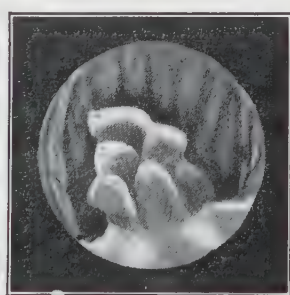


Fig. 58.

Fig. 53.—Verumontanum with long, sausage-shaped cyst anteriorly and small cyst posteriorly.

Fig. 54.—Same as Fig. 53, after both cysts were punctured and removed; slight traces visible.

Fig. 55.—Ulcerated and deformed verumontanum. (Wossidlo.)

Fig. 56.—Congested verumontanum with fibrous bands emerging from its substance and extending backward toward the vesical neck; orifice of ejaculatory ducts not visible.

Fig. 57.—Highly inflamed verumontanum with red, bleeding base, from which emerge a cauliflower polyp anteriorly and a large cyst posteriorly; ejaculatory ducts not visible.

Fig. 58.—Large deformed verumontanum, with cystic degeneration; when punctured, these cysts contained a cheesy material which readily dissolved in the irrigation fluids; ejaculatory ducts not visible.

and especially in those involving the seminal vesicles. Because of this close relationship with the seminal vesicles, the verumontanum has been termed the "mirror of the vesicles"; it is generally accepted that a diseased verumontanum reflects a similar condition in the seminal vesicles.

Because of its anatomical position, it is evident that the verumontanum cannot escape involvement in practically every case of posterior gonorrhea. This particularly should be remembered in connection with the serious functional disturbances which may follow when the ejaculatory ducts and prostatic sinuses are affected. Nevertheless, the frequency of colliculitis is greatly underestimated; numerous cases of posterior infection, therefore, go on for years unaffected by routine treatment, solely because the inflammation of the verumontanum has not been discovered and appropriately treated.

Symptoms of colliculitis being practically identical with those of the seminal vesiculitis which it reflects, are described under that heading (page 177).

Diagnosis is made definitely by visual evidence furnished by the aid of the posterior urethroscope, though the clinical manifestations are strongly suggestive. The verumontanum and the adjacent urethra invariably give ample evidence of more or less serious damage in chronic gonococcal infection.

In the normal state, the appearance of the verumontanum is of more than passing interest. In point of fact, its appearance on examination depends in great measure on the type of examining instrument employed. Examined first with the simple straight or curved tube and later with one of the improved type of instrument, the difference is very striking. With the simple tube, the organ is seen (though sometimes it cannot be studied because of the hemorrhage produced by this type of instrument) as a small swelling, rather poorly illuminated and projecting into the deep urethra like a small red pea (Fig. 43). A positive diagnosis based on such a picture is out of the question. With the improved cystourethroscope, however, the verumontanum is observed as a well-

lighted, distinct projection from the floor of the urethra into the deep urinary canal (Fig. 44). Usually it may be said to resemble an enlarged glans clitoridis, or a small cherry or strawberry. Less frequently, it assumes a cone or dome-like shape, with the opening of the utricle situated at the pointed or flattened apex (Fig. 45,); occasionally, the peak is flattened as though the apex were sawed off (Fig. 46); again it may

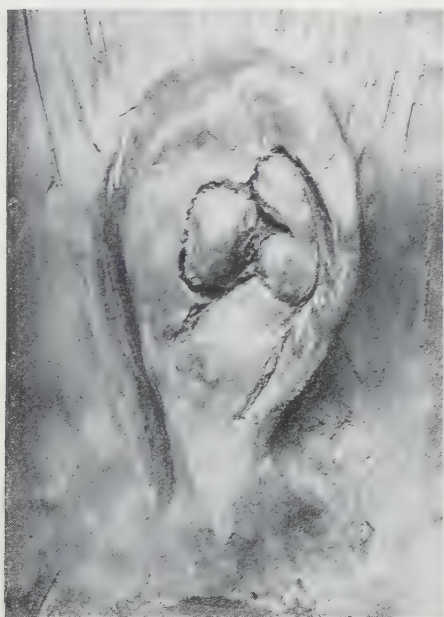


Fig. 59.

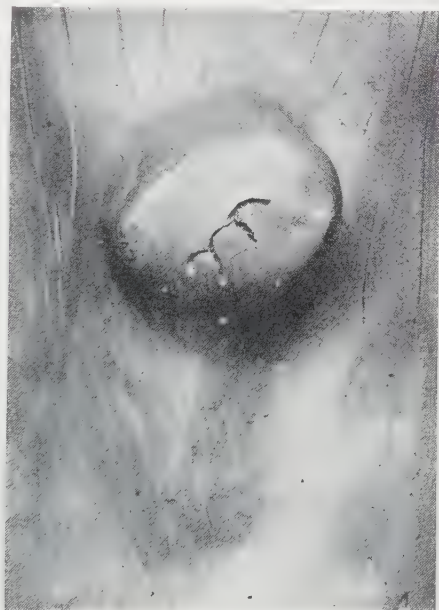


Fig. 60.

Fig. 59.—Unusually large and deformed verumontanum scalloped and elevated above the urethral floor considerably; thick anterior ridge. Clinically, urinary obstruction and sexual neuroses following chronic gonorrhea.

Fig. 60.—Same case as Fig. 59 after five months of treatment; marked improvement clinically; also as to size and shape of verumontanum.

assume a rounded, bulbous shape, resembling a spherical doorknob or electric bulb (Fig. 44).

As a rule, the utricle occupies the summit of the verumontanum, flanked on either side by the ejaculatory ducts. There are exceptions to this rule, of course; the utricle may be situ-

ated on the anterior or posterior wall, in which event it cannot be seen through the urethroscope, and the ejaculatory ducts may be observed on or near the summit or adjacent to

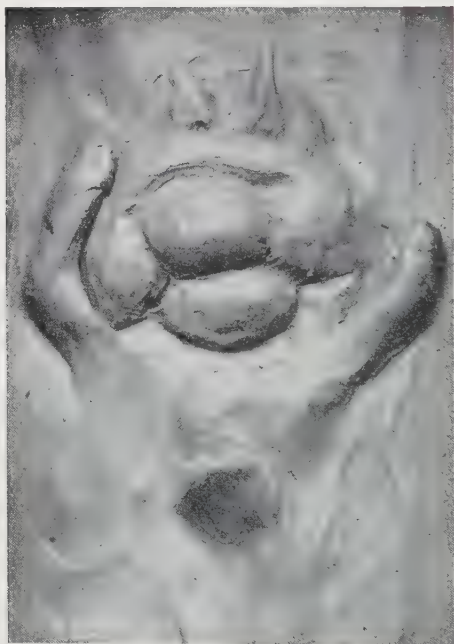


Fig. 61.

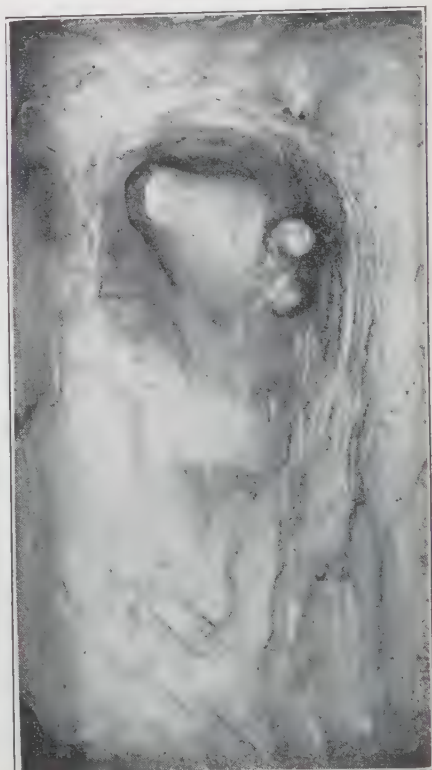


Fig. 62

Fig. 61.—Verumontanum distorted and hypertrophied beyond recognition; anterior surface is scalloped while masses of tissue project from its sides and from its anterosuperior aspect. Clinically, urinary distress and sexual neuroses following chronic gonorrhea.

Fig. 62.—Verumontanum very large, pointed and deformed, two cystic bodies on lateral wall. Clinically, premature ejaculation and sexual neuroses, four years after acute posterior gonorrhea.

the base. Not infrequently, tortuous blood vessels may be seen crossing the anterior aspect from side to side, or descending from the apex, only to disappear in the mucous membrane of the urethral wall or floor. Generally, the walls slope grace-

fully and gradually downward and laterally, forming a concave trough-like lateral sulcus, beyond which rises in an unbroken and continuous curve the lateral wall of the urethra



Fig. 63

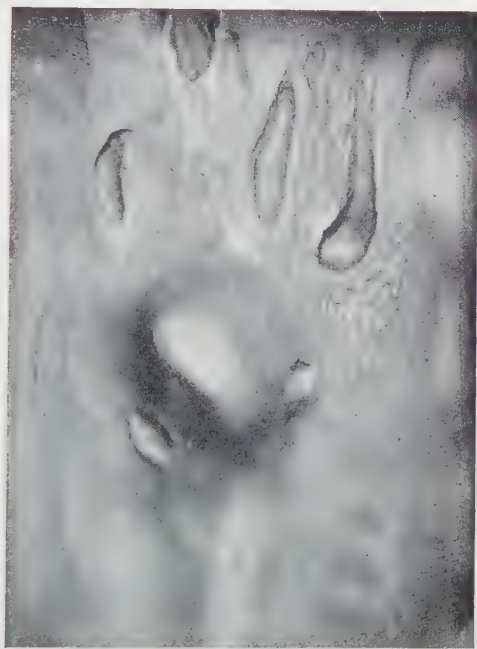


Fig. 64

Fig. 63.—Verumontanum moderately enlarged; prostatic sinuses enormously dilated; postmontane urethral floor trabeculated and cut up into ruts of various depths. Clinically, pain in perineum lasting twenty years after an acute posterior gonorrhea.

Fig. 64.—Same case as Fig. 63, after three months of treatment. Postmontane ruts are gradually disappearing, the mucosa is more nearly normal in color, and the sinuses are becoming smaller. Clinically, much relief from the constant pain.

(Fig. 44). On the other hand, the lateral sulcus may appear in the form of a deep, narrow trench, created by the sharp junction of the opposing walls of the verumontanum and ure-

thra. In these cases, we find the prostatic ducts from three to six in number, long and narrow, with the appearance of deep slits (Fig. 46). When these ducts are probed carefully, it will be observed that they look deeper than they really are; this is due, in all probability, to variations in the illumination and the development of shadows.



Fig. 65.

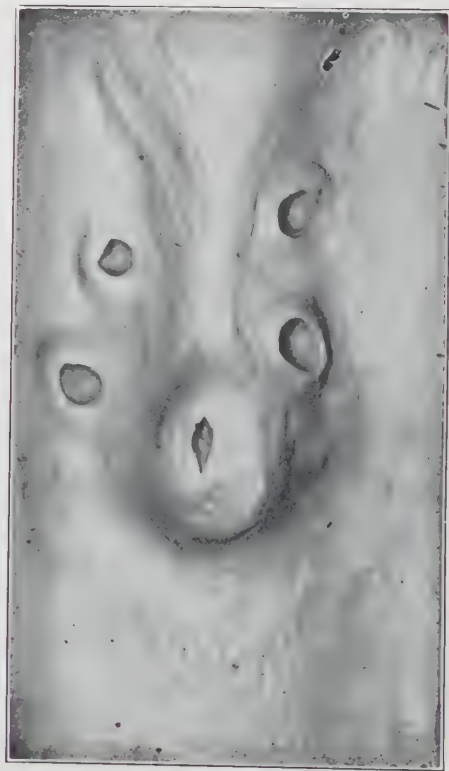


Fig. 66.

Fig. 65.—Verumontanum enormously dilated laterally; prostatic sinuses much dilated; postmontane floor trabeculated. Clinically, complete sexual impotence, duration eighteen years after acute posterior gonorrhea.

Fig. 66.—Verumontanum large and joined to thick, long ridge posteriorly; ejaculatory orifices and utricles enormously dilated. Clinically, partial impotence and premature ejaculation; gonorrhea twenty and fourteen years ago.

Pathology.—The pathologic changes in the verumontanum are exceedingly varied and numerous. Thus we find erosions,

granulations, polyps, cysts, excrescences, hypertrophy, simple congestion, swelling and deformities in shape and size (Figs. 47 to 73).^{*} The urethral floor behind the verumontanum (postmontane floor) may be eroded and cut up into deep ridges, highly inflamed and bleeding easily on contact with the examining instrument (Fig. 68). The minute glandular

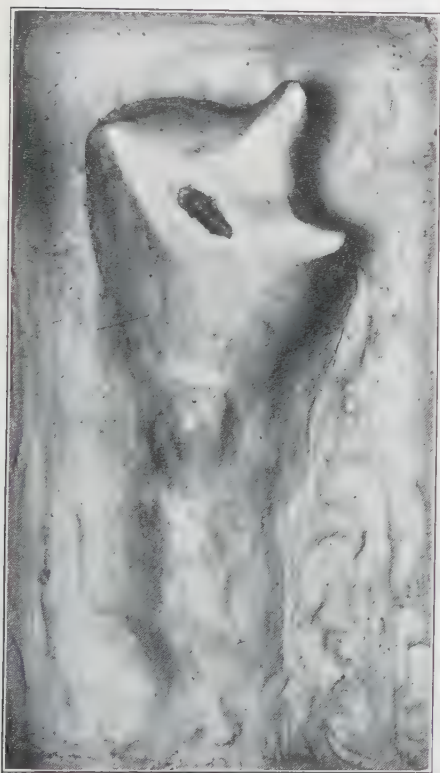


Fig. 67.



Fig. 68.

Fig. 67.—Enormously hypertrophied verumontanum with tissue masses resembling horns; utricle greatly dilated. Clinically, recurrent attacks of gonorrhea.

Fig. 68.—Verumontanum hypertrophied, utricle greatly dilated; postmontane floor cut up into deep ridges; cystic bodies on right posterior urethral wall; large tissue masses projecting from right wall of verumontanum. Clinically, chronic obstinate gonorrhea, three years' duration.

^{*}Figs. 59 to 73 are photographs of wax models of posterior urethral conditions, made by the author, as seen through the cystourethroscope. They were first described in *Annals of Surgery*, October, 1915.

orifices running along the sides of the verumontanum also are involved in the general inflammatory process. Pus often can be expressed through these tiny orifices by massaging the prostate cautiously, per rectum, with the cystourethroscope



Fig. 69.



Fig. 70.

Fig. 69.—Verumontanum hypertrophied and deformed, thick ridge posteriorly. Clinically, painful and frequent micturition, three years' duration; gonorrhea twelve years ago.

Fig. 70.—Verumontanum hypertrophied, cystic body posteriorly. Clinically, pain on micturition and lack of sexual desire, duration one year; gonorrhea three years ago.

in situ; in these cases, the pus can be seen, exuding through the little slits in much the same manner as the thicker stream enters the bladder from the ureteral orifice in surgical kidney

(Fig. 74). The prostate must be large, soft and boggy to lend itself to this manipulation. On the other hand, if these orifices are occluded by the inflammation, they act as a bar to the normal drainage of their glandular ducts and pus accumulations may follow; it therefore becomes necessary to enlarge and open these orifices, either by dilatation (with or

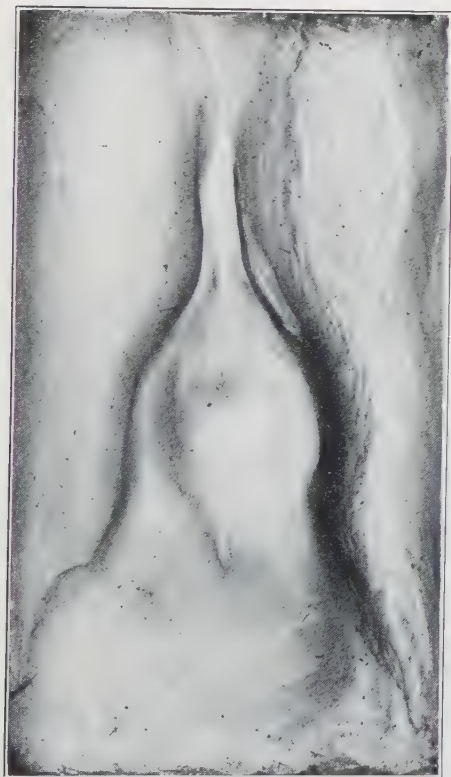


Fig. 71.

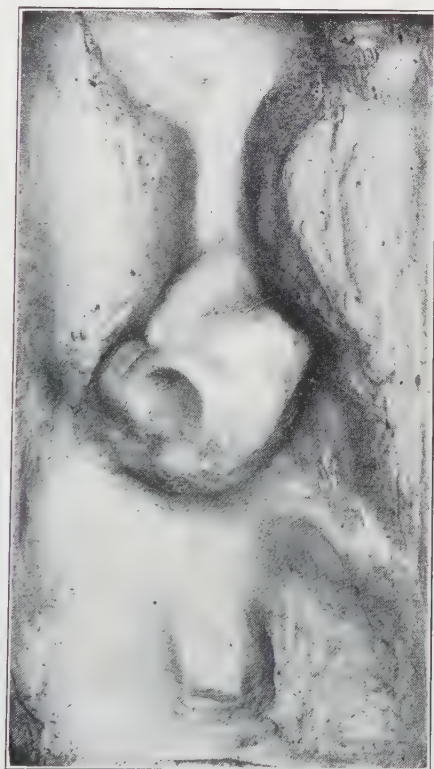


Fig. 72.

Fig. 71.—Verumontanum hypertrophied, with wide thick ridge anteriorly and long narrow ridge posteriorly. Clinically, almost complete impotence, seven years' duration; gonorrhea ten years ago.

Fig. 72.—Verumontanum hypertrophied and deformed, with thick ridge posteriorly. Clinically, recurrent chronic gonorrhea.

without catheterization), or by incision through urethroscope. This method, if properly applied, may bring about complete relief in the most intractable cases.

Treatment.—Hand injections in the treatment of chronic colliculitis are absolutely useless. Local applications, made under the eye through the cystourethroscope, constitute the most useful and only successful therapy at our command. Of the straight, direct vision type, the Luys instrument (Fig. 20) is the most practical and useful. In this country, how-



Fig. 73.—Verumontanum large and inflamed: two cystic bodies posteriorly. Clinically, pain after micturition, lasting several hours; duration three years; onset one year after acute posterior gonorrhea.

ever, the indirect cystourethroscope is by far the more popular type of instrument (Fig. 75). It may be described briefly as a cystoscope adapted to the posterior urethra. It consists of a sheath, similar to that used in the irrigating cystoscope, provided with an aperture on the lower or convex aspect.

In this instrument, the principle of indirect vision of the Nitze cystoscope is applied, so that a right-angled view of the field lying parallel with the axis of the shaft is obtained. The lamp and lenses are so placed that the source of light and

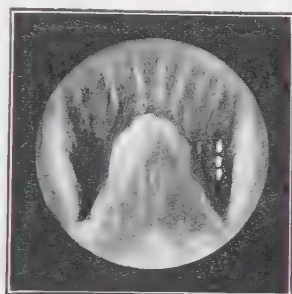


Fig. 74.—Fine stream of pus exuding from left ejaculatory duct on massage of prostate, with instrument in situ; the pus is being washed backward into the bladder by the flow of the irrigating fluid.

the window of the instrument approximate at the same point, giving as nearly perfect optical conditions as possible. The sheath, closed by the obturator, is introduced into the bladder, the urine evacuated and the bladder irrigated, if the

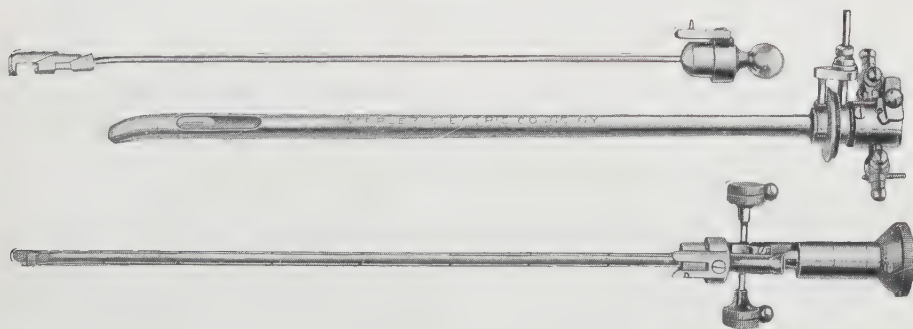


Fig. 75.—Cystourethroscope.

urine is turbid. The bladder having been emptied, the telescope is inserted and the water-flow and electric current turned on.

An irrigating jar containing oxycyanide of mercury solution is connected with the instrument through one of the lat-

eral irrigating cocks in the sheath, so that the parts can be viewed while the urethra is being distended with the flowing water, in the manner suggested by Goldschmidt. Every part of the lower urinary tract, from the orifices of the ureters down to the bulbous urethra, can be brought directly into view by slowly rotating and withdrawing the instrument. It is astonishing to find the large number of intractable cases that owe their chronicity to a chronic inflammation of the verumontanum and adjacent structures. The instrument also can be used for the anterior urethra, the curved beak being replaced by a short, blunt tip; the simple straight tube (Lays or Chetwood model) is to be preferred, however, in this portion of the canal.

Though the verumontanum is firmly fixed on its broad base, it is capable of considerable movement to and fro and from side to side. This can be observed beautifully when the irrigating current is turned on and off suddenly. With the water flowing at a brisk pace, the verumontanum will be seen to move perceptibly in response to the impulse of the stream, while the lateral sulci become wider and more distinct as the fluid compels the outward bulging of the lateral urethral walls. When the current is turned off suddenly and repeatedly in this manner, a much better view of the organ in its various aspects can be obtained than is otherwise possible.

The standard treatment of colliculitis consists, in the main, of local applications of silver nitrate solution, 10:100, on a cotton carrier, to the affected parts, through the cystourethroscope. It is not uncommon for the local application or the mere introduction of the urethroscope itself to be followed by a rather severe local reaction, characterized by bleeding and urinary distress, sometimes to the point of acute retention. In these cases the reaction will quickly subside under the administration of daily intravesical irrigations of a weak solution of the silver salts or the antiseptic dyes, combined with the internal administration of a urinary antiseptic.

Cysts and other abnormal tissue formations found on or near the verumontanum are best treated by puncture or fulguration, or both combined. Papillomata of the urethra or verumontanum respond readily to fulguration, applied through the cystourethroscope in the same manner as in the case of vesical tumors. Adhesions and cicatrices, frequently observed after gonococcal infections, respond after some time, to silver nitrate applications. Usually, however, they are exceedingly obstinate and rebellious to treatment. Persistence is rewarded by a decided improvement in the pathologic urethroscopic picture and the symptoms complained of by the patient.

Catheterization of the ejaculatory ducts is a refinement of therapy which is of considerable value in certain types of cases involving the posterior urethra. In these cases, the patient generally presents evidences of "sexual neurasthenia," with particular involvement of the seminal vesicles. The ejaculatory duct orifices are much inflamed, congested, and often choked up with inflammatory debris; catheterization of these ducts, if skillfully performed, often will bring about a decided improvement in the drainage of the seminal vesicles. Moreover, by this procedure, the silver salts or the antiseptic dyes may be injected through the ejaculatory ducts into the seminal vesicles, to great advantage.*

*Wolbarst: *Urologic and Cutaneous Review*, 1918, xxii, No. 8.

CHAPTER XI

CHRONIC PROSTATITIS

Chronic prostatitis is by far the most important and frequent complication of chronic posterior urethritis; this condition rightly may be termed "chronic gonorrhea." There are few, if any, chronic cases, which do not give evidence of some prostatic involvement.

Even if it involves a repetition, it is important to remember that the gonococcus may remain latent for years in the infected tubular glands of the prostate, without giving any sign of their presence; usually they are associated with secondary bacteria, principally the staphylococcus, less often the streptococcus, enterococcus, colon and pseudodiphtheroid bacillus. In the presence of the gonococcus these organisms lose their virulence; at the same time, by virtue of their superior staying qualities and overwhelming numbers, they seem enabled to overcome the gonococcus and take possession of the field. As a result, relatively few gonococci are found in chronic prostatic infections, though they constitute an important factor in producing the symptoms of chronic gonorrhea.

In cases of long standing, it is often impossible to find any organisms in the smears of expressed prostatic secretion, but the presence of pus in appreciable quantity usually is sufficient evidence to justify the conclusion that an infectious focus exists in the prostate or seminal vesicles. In these cases, sperm culture is essential. Recent observations have demonstrated that the gonococcus thrives in spermiatic fluid. An abundant growth often can be obtained within twenty-four hours on infected seminal fluid, in which the gonococcus could not be demonstrated in the freshly emitted specimen. Even though there may be no clinical symptoms, the seminal

fluid, if properly cultured, may reveal the presence of gonococci. These organisms may be latent and quiescent while in the prostatic follicles, but they may attain fresh vigor and virulence when deposited in the genitals of a healthy sex partner. It is evident, then, that sperm culture should be resorted to in all protracted cases, especially those with complications.

The **pathology** of chronic gonococcal prostatitis has been discussed under "acute prostatitis" and need not be repeated here.

Symptoms.—Chronic prostatitis may exist for a long time without giving rise to any particular symptoms. Usually, however, certain phenomena present themselves, which require attention. These phenomena are of three types,—sexual, urinary and sensory. Briefly stated, the sexual phenomena make themselves manifest in the form of postcoital perineal pains, premature ejaculation, prostatorrhea (a yellowish discharge seen at the meatus intermittently), defecation spermatorrhea and impotence, partial or complete.

The urinary symptoms are characterized by an increased diurnal frequency, sometimes associated with pain and a retarded stream. The urine generally contains a varied number of shreds, which really are plugs of secretion from the mouths of the prostatic ducts and are known as "Fürbringer's hooks." These are squeezed out of the ducts by the muscular contraction occasioned by the act of micturition and are carried out by the urinary flow.

When voided, the urine may be clear and sparkling; this is not to be accepted as an indication of a normal prostate, by any means. However, if the urine be voided immediately after vigorous massage of the organ, it will contain varying amounts of prostatic débris. Phosphaturia is a common condition in prostatitis, noted particularly in cases presenting nervous or "neurasthenic" symptoms. Frequently these patients complain of a whitish material which exudes from the meatus after voiding the urine; this material usually con-

sists of mucus in which are embedded lime salts in varying quantity.

The sensory phenomena are the most difficult to cope with and are widely diversified in character. The patient may be highly neurotic, mentally depressed or melancholic; he lacks interest in life generally. The principal complaint is a vague pain, which may be referred to remote parts of the body. For want of a correct diagnosis these patients are termed "neurasthenic" and dosed with bromides and other nerve depressants, all to little or no purpose. After running the gamut of private and free clinics without relief, they frequently land in an insane asylum or end their lives by suicide.

Diagnosis is not a difficult matter. Chronic prostatitis may be suspected in any case in which there is a history of long standing or recurrent attacks, especially when associated with any of the sexual, urinary or sensory phenomena above mentioned. Clinical examination will confirm or reject this suspicion.

When shreds or pus (or both) are present in the voided urine, their source will be revealed by the judicious employment of the urinary tests already described (see page 48); particular assistance will be rendered by the use of the five glass catheter test, already described, which finds its greatest field of usefulness in chronic prostatitis. Phosphates in the urine, particularly when sensory symptoms are present, are strongly suggestive of chronic prostatitis.

When the prostate is palpated, per rectum, it is generally found enlarged, soft and occasionally boggy. Periprostatitis is not uncommonly present. Massage of the gland may bring forth a copious flow of prostatic secretion at the urinary meatus, especially when the prostate is soft and boggy. If there is no flow of secretion at the meatus, the urine voided immediately after massage will carry with it the secretion emptied into the posterior urethra by the massage.

If the history of the case gives evidence of sexual excess, masturbation, "withdrawal," or ungratified sexual desire, we

have to consider the possibility of a nonspecific prostatitis. Microscopic and cultural examination of the prostatic secretion will reveal the bacterial flora of the prostate and make the diagnosis clear. In short, every available diagnostic aid must be invoked, before systematic treatment is instituted; on the correct diagnosis, the success of the treatment depends.

Treatment.—For the superficial type of chronic prostatitis, the potassium permanganate or weak silver salt irrigations already referred to, will be found of the highest value, especially when gonococci are present. An anterior injection of one of the silver salts, however, often will control an active posterior urethritis even more quickly and satisfactorily than the irrigations. As already described, the urethra may be filled with the solution, which is then massaged gently down into the deeper portions of the canal. When the urine shows considerable pus, however, irrigations preferably should be used.

As soon as the urine tends to clarify and shreds take the place of pus, we resort to the use of deep instillations. They are to be employed carefully and gently, as they are capable of doing much harm otherwise. The deep urethral syringe (Keyes-Ultzmann) is used; the curved shaft is made of silver and is attached to a small syringe, which holds about 30 minims (Fig. 11, page 75).

The tip of the instrument is inserted into the membranous urethra and the solution slowly injected. After filling the posterior canal, most of the fluid gravitates backward into the bladder and may be retained or voided by the patient. It is better that the bladder be emptied previous to an instillation, in order to get the full benefit of the solution on the vesical neck.

The most useful and commonly employed solution for instillation purposes is the nitrate of silver, in $\frac{1}{2}$ to 2 per cent solution. Soon after the instillation there is a smarting and burning sensation in the urethra, associated with a desire to empty the bladder. This sense of burning usually lasts but

a short time, but it may persist for several hours in sensitive individuals; it is associated, at times, with a reflex movement of the bowels. The instillation is administered every two or three days; the strength may be increased gradually, but never above 2 per cent.

If the pain after an instillation is inordinately great, and this happens now and then in men who do not tolerate pain or discomfort, immediate relief can be obtained by an intravesical irrigation of warm normal saline solution.

Of late years, there has been a strong tendency to substitute some of the newer silver salts for silver nitrate; especially is this true of protargol, which is employed in this connection in strength varying from 2 to 10 per cent and by some, even as high as 30 or 40 per cent. It is much less irritant than silver nitrate, even in these high strengths, and is considered by some urologists, equally effective. The other silver salts are used in the same manner, largely on the ground of their being nonirritating, but this is a questionable advantage in these chronic cases.

Copper sulphate sometimes is used, beginning with a 1:500 solution and gradually working up to 1:50 or even stronger. It is especially serviceable in the mild cases, those in which gonococci cannot be found.

Sulphate of thallin has given me much satisfaction. This is used in instillation of a 5 per cent solution, gradually increasing the strength to 12 or 15 per cent; it is particularly useful when the patient is unusually sensitive and hyperæsthetic. In mild cases, it acts exceedingly well and is found advantageous in preparing the patient for the silver nitrate instillations. Finding that he can tolerate the thallin solution, he gradually becomes accustomed to the increased strength and finally accepts the silver nitrate instillation without protest.

When the follicles and parenchyma of the prostate have been affected, the most important single therapeutic measure is **massage** of the prostate, per rectum. The purpose of this

procedure is to promote drainage of the glands and follicles, improve the circulation and stimulate the muscle structures of the organ, thereby aiding in its restoration to the normal state. In the practice of massage, the greatest care should be taken not to exert undue energy in the manipulation, for an acute inflammation of the prostate, epididymitis and perhaps serious injury to the prostate itself may result.

Massage should not be practiced in mechanical fashion. The patient first voids some urine in a glass for inspection, leaving the remainder in the bladder for expulsion after massage. The patient standing in the semierect position (described on page 113), the covered index finger is freely lubricated and inserted *gently* into the rectum. The margins of the prostate are carefully outlined and pressure slowly yet firmly applied on alternate sides of the organ in a sweeping motion from the periphery toward the center of the gland. If the seminal vesicles can be reached with the finger, which is not always the case, they, too, should be stripped in a similar manner. The forearm, as already described, should be in line with the axis of the body of the patient and the surgeon should throw the weight of his body firmly against his elbow, the latter resting against his groin.

When the finger sweeps around and across the surface of the prostate, note is made of variations in its size, shape, and consistency; gentle but firm pressure is applied in particular to such points as are especially soft or hard, swellings, infiltrations and tender areas. Manipulation is thus continued about half a minute, the amount and degree of pressure depending on the condition of the organ and the sensitiveness of the patient.

Cultural examination of the prostatic secretion should be made at frequent intervals during the treatment. To get the most satisfactory results, the anterior urethra is irrigated with a bland solution, the prostate massaged and the secretion thus obtained at the meatus caught in a sterile vessel and cultured. Positive cultures may be obtained in this

manner in cases which invariably give a negative microscopic smear. When, however, the secretion at the meatus is very slight or nil, as is often the case, the patient voids an ounce of urine into a sterile vessel and this urine is cultured and examined.

In long standing cases, or when marriage is contemplated, a more reliable and dependable bacteriologic finding will be obtained through culture of the freshly emitted ejaculated seminal fluid. This method, known as "sperm culture," has been referred to on page 168.

Whether or not the massaged prostatic secretion is subjected to microscopic study, the patient voids the remainder of the urine after massage and this is followed by an intravesical irrigation with one of the silver salts or antiseptic dyes. The solutions thereby penetrate more deeply into the freshly opened prostatic ducts and glands.

Massage is performed two or three times weekly, in the early stages, later reducing the frequency to once weekly; meanwhile massage alternates with the deep silver nitrate instillations previously mentioned. Massage never should be performed in the presence of acute inflammation or great tenderness, in tuberculosis, or when calculi or tender nodules can be palpated.

A word of warning: In certain cases, especially those which are characterized by "neurasthenic" symptoms, the frequent practice of prostatic massage, acting on the already weakened mental endowment of the patient, produces a mental effect which may constitute a distinct psychopathic entity which I have termed the "massage habit." In the clinics patronized by these neurotic patients, it is not unusual for them to come particularly to ask for "a massage," in very much the same manner as a drug habitué begs for his drug. A vicious circle thus is developed, because the temporary relief afforded by the massage is followed by a sense of irritation in the prostatic region as a result of the frequently repeated and often unnecessary trauma perpetrated under

the name of massage therapy. Like everything else of value, massage should be used in moderation; otherwise it becomes a menace to the patient's welfare and the surgeon's peace of mind.

Next in importance to massage and instillations is the rectal recurrent douche. Either hot or cold water may be used, the choice being determined by the patient's tolerance. In the "neurasthenic" cases, the cold douche appears to be the more effective. The psychrophore serves the same purpose as the recurrent douche.

Dilatation of the deep urethra by sounds and dilators also is of great value in certain cases, but their indiscriminate use may be productive of much harm. In the absence of definite indications, their use as a routine measure cannot be justified, in view of the extensive lacerations which they may produce in unskilled hands and the opportunity they afford for reinfection.

For the varied subjective phenomena presented by these patients, therapy must be adjusted to the individual case. The primary indication, however, is to treat the underlying prostatic condition; the subjective phenomena generally will make suitable response.

Additional therapeutic measures which may be applied in prostatitis with success, respond in even greater measure in chronic seminal vesiculitis and will be fully considered under that heading.

CHAPTER XII

CHRONIC SEMINAL VESICULITIS

The acute inflammation having subsided, the infection persists in the vesicles as a low-grade chronic pus focus, which may remain quiescent for long periods or give rise to various phenomena, principally arthritis and the so-called "neurasthenic" symptoms. Belfield very aptly has termed these infected sacs "pus tubes in the male" and has wisely declared that "the time to cure a chronic vesiculitis is in the acute stage." His description of the infection in these sacs is well worth quoting: "When gonococci invade the vesicles, every factor is unfavorable for local defense; the lining consists of one or two layers of cells, a contrast to the heavy armor of the urethra; the vesicle is a closed sac, its contents removed only through its own contractions which even in health expel only a fraction thereof; closure of the front door, the ejaculatory duct, by a pus clot or by swelling, converts the vesicle into a stagnant pool, a culture tube, until its contractions force pus out of the back door into the vas and epididymis."

These pus tubes constantly empty themselves into the posterior urethra, when not clogged, through the ejaculatory ducts. The pus gravitates backward into the bladder and is then carried out with the urine. A small quantity of pus may reach the anterior urinary meatus, especially in the morning and give rise to the so-called "morning drop." The five glass catheter test (page 108) demonstrates this very clearly.

In cases with clear urine, in which there seems to be no clinical trace of the gonococcal inflammation, infected vesicles can be demonstrated without difficulty if they can be reached by the finger in the rectum. The patient having voided clear urine in a glass, the vesicles are stripped gently but firmly;

the urine next voided generally will contain more or less purulent material, which has been forced out of the vesicles. In about 80 per cent of cases, pus cells, with or without bacterial organisms, will be found embedded in this secretion. Frequently this material is worm-like in shape, perhaps several inches in length; this is nothing else than an actual cast of a vesicular tubule.

Gonococci may live in the seminal vesicles long after clinical recovery, in a manner similar to the diphtheria bacillus in the throat and the typhoid bacillus in the gall bladder. This is made evident by the almost constant presence of a positive complement-fixation reaction, in these cases of latent infection.

Undoubtedly, many unexplained cases of recurrent urethritis, epididymitis, arthritis and iritis of gonococcal origin, can be traced to a persistent "locked-in" infection of the vesicles.

Symptoms.—The symptoms of chronic seminal vesiculitis are, with some slight variations, practically the same as those of chronic prostatitis. They may be summarized briefly as follows: A recurrent, slight, mucoid discharge at the urinary meatus, observed especially on arising in the morning, or after alcoholic or sexual indulgence; cramp-like pains resembling those of renal colic, probably due to the futile contractions of the vesicular walls in their attempt to force the vesicular contents through the occluded ejaculatory ducts; painful erections and nocturnal emissions, often blood-stained (hemospermia); disturbances of sexual function, principally premature ejaculation and impotence; spermatorrhea; frequency of urination, especially diurnal; shreds in the urine; phosphaturia; "neurasthenic" pains and aches referred to various parts of the body; mental disturbances of varying intensity.

Belfield and Rolnick* have called attention to the impor-

*Belfield and Rolnick: Jour. Am. Med. Assn., June 12, 1926, p. 1831.

tant fact that infections spreading from the vesicles along the sheath of the vas to Bogros' space, may cause tender swellings, even suppuration, at the internal inguinal ring, which may simulate hernia. I have encountered a number of such cases. Treatment applied to the vesicles usually removes the pseudohernia and relieves the symptoms.

Diagnosis is made by the following data combined with the symptom-complex presented by the patient: The history of a long-standing uncured gonococcal infection; the five glass catheter test, demonstrating the posterior adnexa as the source of the pus, shreds and discharge; large, swollen, tender vesicles, felt per rectum; cloudy urine filled with débris voided after vesicular stripping and massage; cystourethroscopic evidence of the presence of a deformed, congested verumontanum, inflamed orifices of the ejaculatory ducts, inflammation of the adjacent tissues; lastly, radiographs of the injected seminal vesicles, showing evidences of chronic inflammation (not necessary in the average case).

Treatment.—The treatment of chronic vesiculitis has undergone a radical transformation within the past decade. Merely stripping or massaging the vesicles rarely brings about a cure, because the sacs are not fully emptied of their accumulated pathogenic secretions by this procedure, even if they can be reached by the finger in the rectum. The treatment should have one object in view, namely, to disinfect the sacs and empty them of the toxic products which fill them. To this end, various surgical procedures have been devised, each method having distinct merit in certain types of cases.

The chronically inflamed seminal vesicles being the focal point in the dissemination of the pathogenic organisms and toxins which culminate in gonococcal arthritis, it is evident that practically all the more recent methods which have been recommended for the treatment of arthritis, enjoy a certain field of usefulness in the treatment of chronic vesiculitis. Among these methods, the most important are the application of diathermy (described on page 188), intravenous administra-

tion of antiseptic dyes, injection of Pregl's solution, administration of vaccines and proteins, and surgically, by means of vasotomy, vesiculotomy and vesiculectomy. These measures are more fully described on page 103. Most of these methods, with the exception of vasotomy, while successful in the hands of their proponents, have not been in general use sufficiently long to justify their widespread acceptance.

A considerable measure of success in chronic prostatitis and seminal vesiculitis by the employment of **quartz light** therapy, has been reported by McCaskey.* He finds this method especially valuable in cases of stubborn, unyielding chronic abscesses with positive smears, gonococcal or mixed infection, in the large, soft and boggy prostate with negative smears, with subjective disorders, and in the diseased prostate and seminal vesicles accompanied by sexual impotence.

The technic involves the use of a specially constructed quartz hollow tube applicator, six inches long and one inch in diameter, fitted to a Kromayer lamp. The tube is gently inserted into the rectum, until the resistance of the prostate is encountered; the patient stands with the body bent forward at right angles. After an average of ten treatments, in his cases, the prostate has returned to the normal both as to size and consistency. In twelve cases of functional impotence, of long duration, a return of sexual power in varying degree occurred.

Vasotomy: Belfield's Operation.—At the present writing, the treatment which has produced most generally satisfactory results in the hands of urologists has been the injection of an antiseptic fluid into the vesicles by means of vasotomy. In my personal experience, covering several hundred cases thus treated, this operation has proved of inestimable value; it is the ideal method of treatment in the average case of vesiculitis. The most striking results have been observed in cases belonging to the "neurasthenic" and arthritic groups,

*N. Y. Med. Jour., May 4, 1921.

particularly the latter. In unusually severe cases in which vasotomy has failed, drainage or excision through the perineal route is indicated.

Vasotomy is best done in a hospital or in the patient's home, where he can rest in bed a day or two. Moving about immediately after the operation may be followed by an epididymitis. This or any other complication has not occurred in any of my cases.

For several days before operation the prostate and vesicles are vigorously massaged and the bladder irrigated daily, in order to empty the vesicles as much as possible. Under local anesthesia, the vas deferens is exposed through a short incision in the scrotum, near the external ring. After carefully stripping its many fine coverings, a solution of one of the silver salts is injected into the vas by means of a syringe and a blunt pointed needle of fine caliber. Usually 10 c.c. of 5 per cent argyrol or collargol are injected. Chlorazene solution, 1:200, is preferred by some, because while it is equally effective as the silver salts as an antiseptic, it does not stimulate the formation of cicatrix and pressure on the vas, which may occur through possible leakage or regurgitation at the point of injection into the scrotum. Unless there is an obstruction in the vas or in the ejaculatory ducts, the solution thus injected can be recovered almost immediately through a catheter inserted in the bladder, thus demonstrating that the fluid has passed through the vesicles and the ejaculatory ducts into the posterior urethra and bladder. The vas is then dropped back into the scrotal sac, and a small gauge drain inserted, which is removed in 24 hours. The skin and fascia are closed with a chromic suture and a dry dressing applied, held in place by a suitable jock strap. The entire procedure, if properly performed, is absolutely painless; my personal preference for the anesthetic is a 1:200 solution of procaine with adrenalin, used freely.

For several days, sometimes for weeks, the urine voided by the patient may be stained black or brown by the retained

silver solution; a seminal emission occurring ten or twelve days after operation, likewise may be brown or black in color.

After vasotomy, it will be found advantageous to administer vaccines to combat the general toxemia which generally is associated with chronic vesiculitis. A faithful adherence to this method of therapy usually will bring about the desired results in the vast majority of cases. According to Belfield, its originator, who performed vasotomy on 1143 men in twenty-two years, vasotomy terminates the infection in the seminal vesicles in at least 80 per cent of cases in which it is employed; it never causes impotence, though it may cause sterility through lack of skill in the operator; no major operation should be done until vasotomy has been made and has failed.

Vasopuncture strongly advocated by B. A. Thomas, consists of a simple puncture of the vas (without incision), after the usual exposure. A fine hypodermic needle attached to the syringe is used. The medicating fluid then is injected. It is claimed for this method that the lumen of the vas is less apt to become narrowed at the site of the injection.

The question often is asked, whether or not this operation induces sterility through the occlusion of the vasa deferentia. Belfield and others have shown that the chemical solution does not induce sterility in the average case. In my own cases, spermatozoa have been found in approximately 90 per cent of cases in which a 5 per cent solution of argyrol was employed. It is believed that the growing employment of elorazene solution, 1:200, will diminish materially the risk of closure of the tube and consequent sterility. Quite recently, Belfield and Rolnick have recommended the employment of aristol, 10 grams, stirred up in 30 c.c. of cod-liver oil or goose oil. They report that these animal oils are absorbed more readily than the chemical solutions hitherto used and because of that fact, the danger of injury to the vas and adjacent tissues is considerably diminished. It should be remembered, however, that vasotomy is performed in cases

in which the vitality of the spermatozoa has been compromised by the pathologic character of the prostatovesicular secretion. Also, that many of these patients have had bilateral epididymitis, or occluded vasa, which per se, are potent sterilizing factors. It is therefore quite likely that many of these patients were sterile before the operation was done. On the other side of the account, however, is the fact that vasotomy often empties the vas deferens and ejaculatory duct of the pus and other detritus which so often occludes them and thereby renders the patient sterile. It therefore is reasonable to assume that for every case of sterility produced by vasotomy, at least another case is relieved of a previously existing sterility produced by the occlusion of the vasa and ejaculatory ducts. But even if it were true that vasotomy creates more sterility than it relieves, there remains the consoling fact that these patients are better off sterile than infectious. (See footnote on page 184.)

Chronic Epididymitis.—This condition, the remains of an acute infection of the epididymis, usually requires no special treatment; as a rule, the patient is not made aware of any inconvenience or pain because of this chronic inflammation. There is a more or less distinct thickening of either end of the organ, or of the entire organ itself, which generally is painless and calls for no particular attention. Differential diagnosis must exclude tuberculosis, gumma, neoplasm and mycotic infections.

Cases are not uncommon, however, which give the patient considerable annoyance. The so-called "neuralgia of the testis," is typical of this condition. The patient suffers considerable pain in the affected epididymis, either intermittently or continuously, and is generally miserable in consequence. No known treatment seems to be of any avail and the only measure that is at all productive of relief is excision of the offending epididymis (epididymectomy). While this seems to be a rather radical measure at first sight, it is obvious on further consideration that the patient has everything to gain

and nothing to lose through this procedure. The chronic thickening of the epididymis already has produced sterility on that particular side of the genital tract, in all probability; the patient, therefore, is no worse off in respect to fertility if his "neuralgic" epididymis is removed. At all events he has gained relief from his pain.

There are other conditions which are responsible for this distressing condition, notably, chronic prostatitis, active seminal vesiculitis, malignant tumors of the prostate and very commonly, a testis retained within the abdomen or in the inguinal canal. Marked varicocele also may produce a severe pain in the testis, probably through pressure or because of the weight of the venous mass. An interstitial inguinal hernia, in which there is considerable pressure on the spermatic cord, also may be the cause of neuralgic pains in the testis. Adhesions in the tunica vaginalis, with obliteration of the digital fossa, constitute a frequent causative factor. Cysts of the epididymis, resulting from similar adhesions, and which may attain very large size, also may be the cause of severe pain or tenderness. Surgical measures are indicated in these cases.

Another and more common type of epididymitis which is productive of much annoyance is that in which recurrence of acute or subacute inflammation takes place. From time to time the acute inflammation which originally appeared as a complication of the acute gonorrhea returns without apparent cause. Each recurrent attack of urethritis or a mild trauma, is apt to be signalized by the reappearance of the epididymal inflammation. In these cases, as previously mentioned, the cause of the recurrence is likely to be found in a chronic, persistent infection of the prostate or seminal vesicles.

Frequently one hears of the almost miraculous absorption of these epididymal indurations by massage and various electric treatments, but the reports are unverified; generally these measures are of little or no value.

The importance of these chronic inflammations should not be underestimated. It is exceedingly important to study and watch them carefully, for at any time, they may become the seat of a tuberculous or malignant focus. In fact, it is wise to regard with suspicion any inflammation of the testis or epididymis which does not respond to usual therapeutic measures. In these cases, excision not only relieves the pains and prevents the occurrence of exacerbations, but may prevent the possible development of tuberculosis or malignancy in these organs.

Within the past year, Belfield and Rolnick have been employing neoarsphenamine and sulpharsphenamine with striking success in cases with typical clinical symptoms of vesiculitis, in which syphilis has been ruled out. Four or five doses of neoarsphenamine 0.45 gm. have been administered intravenously at four or five day intervals. In about fifty per cent of cases there has been a complete relief of symptoms. Pus has disappeared from the urine and there has been no recurrence in some cases over a period of nine months. Similar results have followed the intramuscular injection of sulpharsphenamine 0.4 gm. at the same intervals. A series of thirty cases in which these methods were employed was reported at the current meeting of the American Medical Association (May, 1927). If the vesicles can be sterilized through these injections, vasotomy will be unnecessary. In the unsuccessful cases, however, vasotomy will be indicated.

CHAPTER XIII

DIATHERMY IN GONORRHEA*

The application of diathermy in gonococcal infections is based on two important facts: First, that the gonococcus can be destroyed quickly in living tissue by the rise of a few degrees in temperature; second, that the particular part of the body heated by diathermy acquires thereby an increased blood supply with stimulation of phagocytosis and the formation of antitoxins.

Within the past few years, this method of therapy has acquired widespread favor because of the excellent results attained in various directions. Particularly is this true as regards the complications in gonococcal infection, in which diathermy finds a broad field of usefulness. The method still is in the experimental stage in some technical respects, but there is every reason to believe that these technical difficulties will be overcome in due course of time.

Increasing experience shows that diathermy inhibits bacterial growth and kills the gonococcus under suitable temperature; it stimulates cell metabolism and thereby increases tissue resistance; it stimulates phagocytosis by increasing leucocytic invasion; it increases the blood supply to the parts, thus aiding in the absorption of exudates; lastly, it has a distinctly analgesic action and relieves venous congestion.

Acute Anterior Gonorrhea.—In acute urethritis of gonococcal origin, diathermy has not yet attained the complete success we have been hoping for, largely because of the technical difficulties involved. In the beginning, the current was applied by means of a thermophore inserted in the urethral canal (Fig. 76), but this method has not proved successful, for obvious reasons. A recent improvement in technic of

*Abstracted in part from "Diathermy" by Corbus and O'Connor.

administration consists of two metal electrodes which are apposed to the lateral walls of the penis like a splint (Fig. 77). The current passes through the penis transversely from one electrode to the other, thereby heating the entire anterior urethra to the desired temperature.

I have found this method of application of great value in acute anterior infection. The current is applied to the point

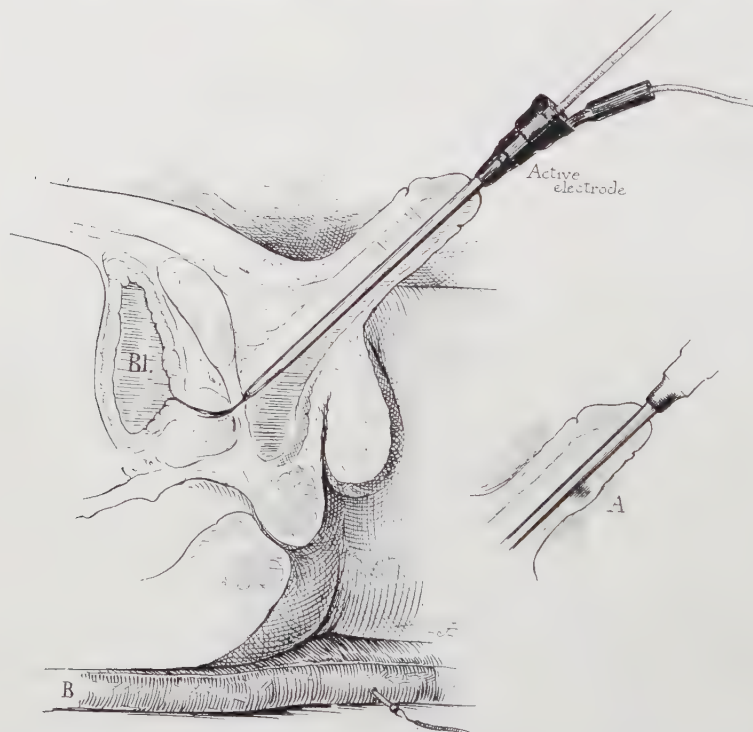


Fig. 76.—Thermophore applied to the anterior urethra. Insert *A* shows the method of treatment of periurethritis. At times it is advantageous to place a flat electrode over the ventral surface at *B* for localization of the heat directly over the infected area. (Corbus and O'Connor.)

of maximum tolerance for thirty to fifty minutes, once, or preferably twice daily, for three or four days. Between the diathermic applications, I administer an anterior urethral injection of one of the silver salts, retained ten to twenty minutes. The results of this method have been extremely grati-

lying, especially when applied in the early stages of the urethral infection. A perceptible decrease in the inflammatory symptoms quickly results. If this treatment has not succeeded in destroying *all* the gonococci, it generally has had the effect of materially diminishing the severity and duration of the inflammatory process, without posterior ex-

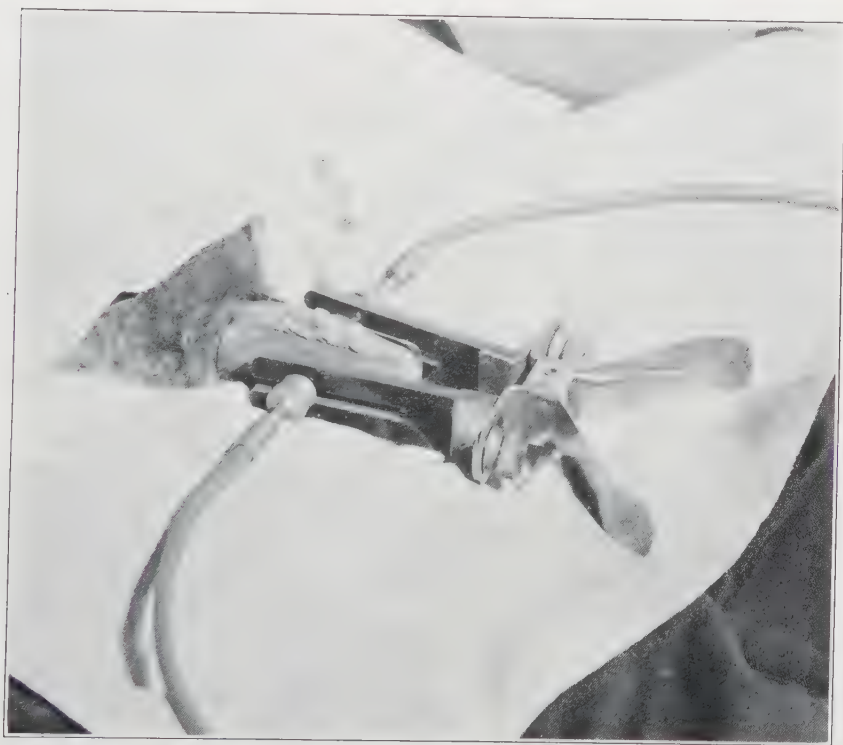


Fig. 77.—Electrodes applied to the lateral walls of the penis like a splint. (Wappler.)

tension or complications. In some cases, the results attained by this method have been startling; even though failure may result, the method is deserving of trial in the early stages of the infection.

Periurethritis and Folliculitis.—In these conditions diathermy has been employed successfully. The localization of

heat in the occluded ducts relieves the inflammatory swelling and opens the lumen for the drainage of their infected contents; in addition, the retained gonococci are quickly destroyed. Administration is identical with that in urethritis.

Stricture.—Diathermy is applied either by means of flexible bougies for the more narrow strictures or metal electrodes for those of larger caliber. A temperature of 105 to 107° F., usually suffices to bring about relaxation of the constriction. At the conclusion of the diathermic treatment, progressive dilation is instituted.

Prostatitis, Prostatic Abscess and Seminal Vesiculitis.—In these conditions diathermy has given its most striking results. No other method of treatment has been so successful in reducing the congestion and decreasing the inflammation.



Fig. 78.—Monaelesser prostatic electrode.

A rectal thermophore is employed; the Monaelesser rectal electrode (Fig. 78) is deservedly popular. The patient is placed in the dorsal position or he may lie on his side, the knees slightly flexed, in either case. The inactive electrode made of block tin or wire mesh, four by five inches in size, is thickly coated with green soap or shaving cream to retain the moisture and placed over the pubic region. The auto-condensation couch may be used as the inactive electrode. The rectal examination having revealed the localization of the inflammatory process, the rectal thermophore is lubricated and inserted in such a manner that the exposed metal surface comes in direct contact with the point of maximum inflammation (Fig. 79). The thermophore, held in position by the special metal holder or a sand bag, the current is turned on and advanced slowly to a point just below the tolerance of the patient. The duration of treatment is about forty minutes. If properly administered, there should be no

pain whatever other than a sensation of heat and a slight tenesmus due to the anal distention. The duration of the treatment may be diminished to twenty minutes, if the patient can tolerate a higher temperature. Treatment is administered twice weekly for three or four weeks.

Cumberbatch uses a belt electrode instead of the metal sheet, the advantage being that it offers a broader distributing surface for the current. If the vesicles are to be treated,

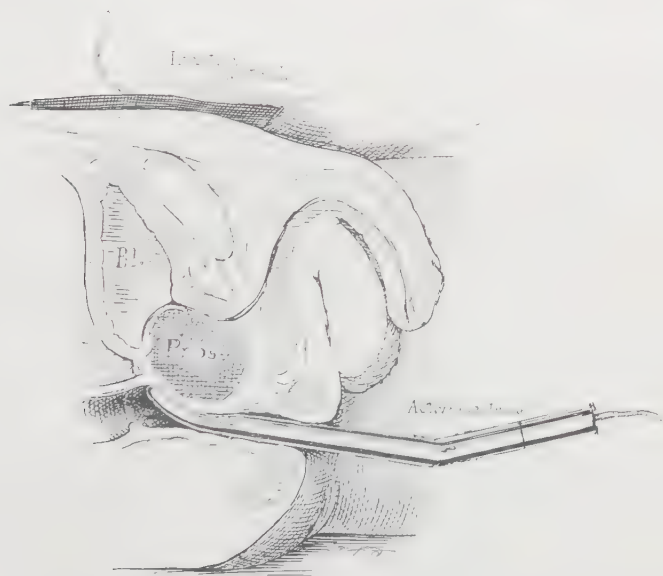


Fig. 79.—Prostatic electrode in place; inactive electrode on abdominal wall.
(Corbus and O'Connor.)

the belt is placed higher up, around the waist, the lines of current flow passing through the entire length of the vesicles.

Epididymitis: Orchitis.—The diathermic apparatus for the testes consists of two concave discs attached to either arm of a specially designed clamp. Each disc is connected with a binding post, a bipolar current thus being applied. The discs being adjustable, will fit snugly over any sized scrotal content (Figs. 80, 81). The current is applied so as to raise the temperature to 108° F., and maintained for forty minutes.

In cases thus treated during the first twenty-four hours, one treatment usually suffices to check an acute attack and induce resolution. Three or four treatments generally are required for advanced cases. It goes without saying that surgical measures are indicated when the case presents a continuous high temperature, chills, tumefaction of the scrotum,



Fig. 80.—Application of electrodes in acute epididymitis. The two poles are placed so that the heat passes through the organ. (Corbus and O'Connor.)

and suppurative foci. Before this condition arises, however, diathermy may be found decidedly of value.

Arthritis.—Diathermy is a distinct sedative for any inflamed joint; it is considered a specific in gonococcal arthritis because of the lethal effect of the heat on the gonococcus. But it should be remembered that while the gonococci in the joint

may be destroyed by the diathermic current, permanent results cannot be expected until the persistent infectious focus, usually located in the prostate or seminal vesicles, is destroyed (Fig. 82). In my personal experience, the most satisfactory results have been attained by vasotomy followed by diathermy.



Fig. 81.—Electrodes applied to the lower pole and the vas as it emerges from the external ring. (Corbus and O'Connor.)

Cumberbatch finds it unnecessary to apply diathermy to the affected joints. Treatment of the affected prostate or seminal vesicles is sufficient to bring the arthritis to an end. Extremely satisfactory results have followed in cases thus treated.

Iritis.—The severe pain accompanying this complication is quickly relieved by the application of diathermy. In these cases, too, the aim should be to remove the infectious focus

and for that reason, the treatment is applied to the prostate and seminal vesicles, with excellent results.

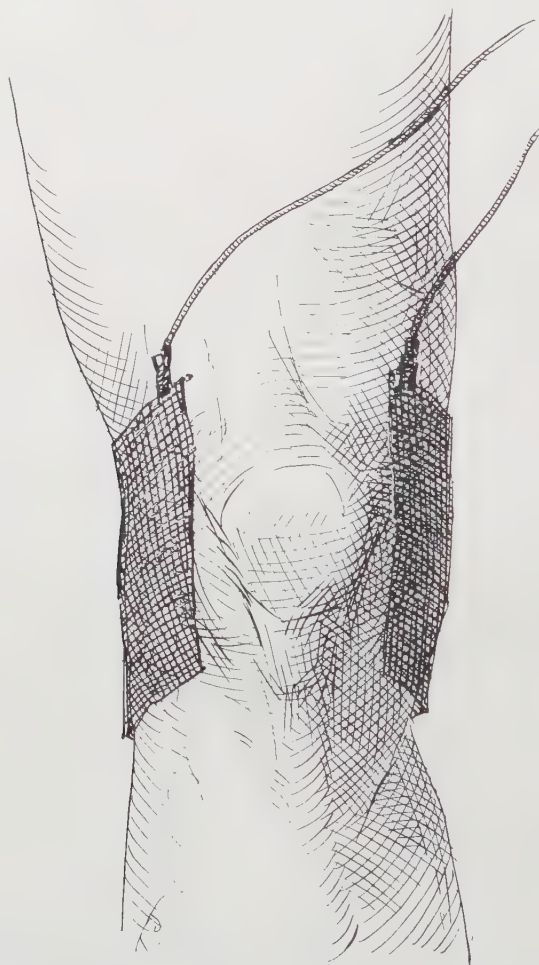


Fig. 82.—Electrodes applied to the knee in the treatment of gonococcal arthritis.
(Corbus and O'Connor.)

It is evident, then, that in diathermy we have a method of therapy which not only has produced excellent results in these obstinate conditions, but promises to effect still better results with the improvement in technical equipment and management.

CHAPTER XIV

METHODS OF DETERMINING THE SOURCE OF PUS AND SHREDS IN THE URINE

Inflammatory products arising in the genitourinary tract are carried out by the urinary stream in the act of micturition. This fortunate circumstance makes it possible to determine the location of the inflammatory focus by studying the urine and its abnormal contents. It is a curious fact, however, that this important phase in diagnosis has not received more than casual attention in urologic textbooks; most authors consider it sufficient to describe the two glass test or its three glass modification, in spite of its manifest fallibility. Commendable exception must be noted in the works of Luys, Thompson Walker, Oelze, Lumb, V. C. Pedersen, Lowsley and Kirwin and Wiener (Brussels), who have emphasized the importance of these urinary tests.

The simplest of these tests is the **Thompson Two Glass Test**, already described on p. 46. Thompson appears to have been the first to observe that valuable information could be obtained if the patient voided urine in two glasses, thus dividing the stream into two parts. He observed that the first urine voided flushed the urethra by carrying pus and shreds with it, leaving the canal cleansed; the second part of the stream passing over this cleansed urethra, appears in the second glass. (See Figs. 3, 4, and 5.)

While this test is useful as a daily routine measure in acute gonococcal urethritis with much pus, it is undependable in chronic cases with little secretion, because of the illusive information it may give. Experience has shown that mucus and shreds accumulating in the posterior urethra in moderate amount, may be carried out by the urinary stream into the first glass and the second urine would be clear; this would

give the erroneous impression that the shreds originated in the anterior urethra. In the presence of considerable pus, however, this test generally is dependable, but should be checked by other tests for accuracy.

The older writers on the subject added a third glass to this test, the theory being that the contraction of the muscular fibers around the vesical neck, straining to bring forth the last drops of urine, will indicate the presence of prostatic disease by the deposit of pus in the third glass; if the urine in the third glass is clear, the prostate is considered normal.

As already stated, some present day urologists refer to this modification with approval; frequently it is the only urinary test mentioned in their works. Experience shows, however, that this test suffers from the same liability to error as the original two glass test, because it does not differentiate with any degree of accuracy between pus having its origin in the anterior urethra and that coming from the posterior part of the canal or the prostate. Not infrequently, the final drops of urine voided are perfectly clear, even in the presence of palpable prostatic and vesicular disease. In these cases, the inflammatory products lie embedded in the ducts and follicles and no amount of bladder straining will force them into the urinary stream. This test, therefore, is apt to be grossly misleading in chronic cases especially.

This and other similar modifications of the original test, involving the addition of a fourth or a fifth glass, must be employed with the knowledge that they lack mechanical accuracy and are dependent on purely theoretical considerations. For this reason, the irrigation tests are much more dependable.

Smith Irrigation Test.—The simplest of these tests, consists in washing the anterior urethra clean into Glass 1. The washing is continued until clear as a control, into Glass 2. The patient now voids his urine into Glass 3. If this urine is clear, it is certain that the inflammatory products do not originate in the posterior urethra or higher up in the urinary tract; if

this urine contains pus, it may have its origin in the deep urethra or higher up in the urinary tract. The essential defect of this particular test, is that it does not differentiate between the posterior urethra and the upper urinary tract; its outstanding merit is the differentiation of the anterior urethra from the rest of the urinary tract. It is extremely valuable as a routine test. (See Figs. 6, 7, 13, 14, and 15.)

The Kollmann Test.—This test is performed exactly as the Smith test, except that the patient voids urine in three glasses after the anterior urethra has been irrigated. After the urethral flushing, the urine passed into Glass 3 contains the pus and shreds originating in the posterior urethra; the urine in Glass 4, is said to represent the bladder urine; the urine in Glass 5, is said to represent the last drops of urine expressed from the bladder and contains the inflammatory products squeezed out of the prostatic ducts and follicles by straining. While this test is a decided improvement on the simple Smith test, it has the same cardinal defect,—it lacks mechanical accuracy, especially as regards the fourth and fifth glasses.

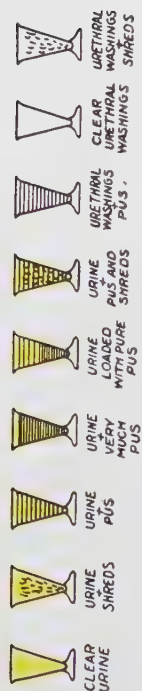
Kromeyer's Test.—In order to be sure that none of the irrigating fluid has passed beyond the cut-off muscle into the deep urethra and thus vitiated the test, Kromeyer irrigated the anterior urethra with a 1:1000 solution of methylene blue. If any of the colored fluid has passed the cut-off muscle, the shreds and the urine itself when voided by the patient, will be stained with the irrigation solution. This is a very useful procedure.

Lohnstein Test.—Lohnstein irrigated the anterior urethra with a solution of ferrocyanide of potassium. The patient then voided his urine into a glass, to which a few drops of tincture of chloride of iron have been added. If any of the irrigating fluid has passed the cut-off muscle, the urine thus voided will be colored blue as the result of the chemical reaction produced.

Jadassohn-Goldenberg Test.—A marked advance in the positive diagnosis of posterior urethral and prostatic infection was made by Jadassohn and Goldenberg, working independently, when they devised the "Expression Test." As more recently modified, the test is applied as follows: The anterior urethra is irrigated, as above described, until the washings come clear into the control glass (Glass 2). The patient voids urine into Glass 3. This gives us the washings from the posterior urethra. The prostate then is massaged vigorously and the patient voids urine into a fourth glass. This glass will contain the prostatovesicular secretion. This test is reliable and trustworthy and is of great value in routine practice. It should be used in chronic conditions exclusively, owing to the inherent danger of prostatic massage in the acute stages (see Fig. 16).

Wolbarst Five Glass Catheter Test.—A careful analysis of these tests will show that they offer no method by which inflammatory products can be differentiated as to their origin, as between the posterior urethra and bladder, with absolute accuracy and precision. All of these tests assume that after the anterior urethra has been irrigated the first urine voided carries the washings from the posterior urethra, the next urine represents the bladder urine and the third urine voided represents the bladder urine plus the inflammatory products squeezed out of the prostatic glands and ducts. As to the urine voided in the first glass, there can be no doubt of their origin, if shreds alone are voided. But when pus is voided with the urine, how can one tell whether this pus has originated in the posterior urethra or in the prostate or in the bladder or even higher up in the urinary tract? And how can one be sure that the last drops of urine contain shreds or pus cells squeezed out of the prostatic follicles? The answer is that one cannot tell by the use of these tests.

The five glass catheter test, already described on page 108 meets this question satisfactorily. By means of this test, it



Explaining method of indicating contents of glasses shown in illustrations.
(Glasses representing urethral washings are not colored.)

ACUTE URETHRITIS

REGION INVOLVED	FINDINGS AT MEATUS	THREE GLASS TEST	JADASSOHN "EXPRESSION" TEST	FIVE KOLLMANN GLASS	FIVE GLASS CATHETER TEST	PROSTATE PER RECTUM	SECRETION OBTAINED BY MASSAGE
ANTERIOR URETHRA	DISCHARGE	URINE ANT. URETHRA POST. URETHRA BLADDER	URINE ANT. URETHRA POST. URETHRA AFTER MASSAGE	WATER ANT. URETHRA CONTROL POST. URETHRA BLADDER URINE PROST. DUCTS	WATER ANT. URETHRA CONTROL POST. URETHRA BLADDER URINE AFTER MASSAGE	PROSTATE PER RECTUM	SECRETION OBTAINED BY MASSAGE
POSTERIOR (SLIGHT)	—	URINE ANT. URETHRA POST. URETHRA BLADDER	URINE ANT. URETHRA POST. URETHRA AFTER MASSAGE	WATER ANT. URETHRA CONTROL POST. URETHRA BLADDER URINE PROST. DUCTS	WATER ANT. URETHRA CONTROL POST. URETHRA BLADDER URINE AFTER MASSAGE	PROSTATE PER RECTUM	SECRETION OBTAINED BY MASSAGE
POSTERIOR (CONSIDERABLE)	—	URINE ANT. URETHRA POST. URETHRA BLADDER	URINE ANT. URETHRA POST. URETHRA AFTER MASSAGE	WATER ANT. URETHRA CONTROL POST. URETHRA BLADDER URINE PROST. DUCTS	WATER ANT. URETHRA CONTROL POST. URETHRA BLADDER URINE AFTER MASSAGE	PROSTATE PER RECTUM	SECRETION OBTAINED BY MASSAGE
POSTERIOR & TRIGONE (URETHROCISTITIS)	—	URINE ANT. URETHRA POST. URETHRA BLADDER	URINE ANT. URETHRA POST. URETHRA AFTER MASSAGE	WATER ANT. URETHRA CONTROL POST. URETHRA BLADDER URINE PROST. DUCTS	WATER ANT. URETHRA CONTROL POST. URETHRA BLADDER URINE AFTER MASSAGE	PROSTATE PER RECTUM	SECRETION OBTAINED BY MASSAGE
ANTERO-POSTERIOR (MILD)	DISCHARGE	URINE ANT. URETHRA POST. URETHRA BLADDER	URINE ANT. URETHRA POST. URETHRA AFTER MASSAGE	WATER ANT. URETHRA CONTROL POST. URETHRA BLADDER URINE PROST. DUCTS	WATER ANT. URETHRA CONTROL POST. URETHRA BLADDER URINE AFTER MASSAGE	PROSTATE PER RECTUM	SECRETION OBTAINED BY MASSAGE
ANTERO-POSTERIOR (SEVERE)	—	URINE ANT. URETHRA POST. URETHRA BLADDER	URINE ANT. URETHRA POST. URETHRA AFTER MASSAGE	WATER ANT. URETHRA CONTROL POST. URETHRA BLADDER URINE PROST. DUCTS	WATER ANT. URETHRA CONTROL POST. URETHRA BLADDER URINE AFTER MASSAGE	PROSTATE PER RECTUM	SECRETION OBTAINED BY MASSAGE

SUBACUTE AND CHRONIC URETHRITIS

		G ₁	G ₂	G ₃	G ₁	G ₂	G ₃	G ₁	G ₂	G ₃	G ₁	G ₂	G ₃			
ANTERIOR (SLIGHT) STRICTURE	DISCHARGE OR A.M. DROP														NORMAL	NORMAL PROSTATIC SECRETION
ANTERIOR (SEVERE)	PROFUSE DISCHARGE														"	"
POSTERIOR (SUPERFICIAL)	—														"	"
POSTERIOR (SEVERE) INVOLVING PROSTATIC DUCTS	—														LARGE AND CONGESTED	PUS AND DETRITUS
ANTERO-POSTERIOR SUPERFICIAL	DISCHARGE														NORMAL	NORMAL PROSTATIC SECRETION
ANTERO-POSTERIOR (INVOLVING PROSTATIC DUCTS)	"														MODERATELY LARGE AND TENDER	PUS AND DETRITUS
ANTERO-POSTERIOR (SEVERE) URETHROVITIS	"														VERY LARGE AND TENDER HARD OR DOUGHY	PUS AND DETRITUS
CHRONIC PROSTATITIS WITHOUT URETHRITIS	—														LARGE HARD OR DOUGHY	PUS AND DETRITUS
CHRONIC PROSTATITIS WITH POSTERIOR URETHRITIS	OCCASIONAL MORNING DROP														"	"
CYSTITIS OR	—														NORMAL	NORMAL
PYELITIS	—														LARGE CONGESTED SOFT AND DOUGHY	PUS AND NORMAL ELEMENTS
PROSTATORRHEA OR SPERMATORRHEA	—															

Plate VI.—Illustrating the author's five glass catheter test and other urinary tests.

is a simple matter to differentiate with accuracy the source of pus or shreds, as between the anterior urethra, posterior urethra, prostate, seminal vesicles and the major urinary tract (bladder, ureters and kidneys). The characteristic feature of this test lies in the use of a fine calibered soft catheter to draw off the vesical urine immediately after the anterior urethra has been flushed and cleared. It takes but a few moments to make this test, but the amount of information thus derived is most invaluable. It might be added, in passing, that this test serves equally well in the determination of the source of blood in the urine.

This test is open to the criticism that there is a risk of infecting the bladder with exudate from the posterior urethra while inserting the catheter into the bladder. It may be said in this regard, that no such infection has been observed in thousands of tests which have been made by this method; moreover, the test is employed only in chronic conditions, in which the risk of carrying infection back into the bladder is practically nil.

Pedersen's Modification of Wolbarst's Five Glass Test.*—To avoid any possibility of infection of the bladder, as above mentioned, Pedersen has modified this test, as follows:

The anterior urethra having been thoroughly flushed and irrigated (Glass 1) and with a control showing that the urethra contains no débris (Glass 2), the patient voids a small quantity of urine into Glass 3; this represents the washings from the posterior urethra. Now the catheter is inserted and some of the bladder urine is withdrawn into Glass 4; this contains bladder urine uncontaminated by urethral débris. The rest of the test continues as in the Wolbarst Five Glass Test.

This modification appears to nullify, in some degree, the purpose of the original five glass test. When the patient voids into Glass 3, it is impossible by this test to say whether the débris found in that glass originated in the bladder or in

*V. C. Pedersen: Textbook of Urology, Lea & Febiger, 1919, p. 453.

The Five Glass Catheter Test (Wolbarst) for the Determination of the Source of Pus and Shreds in Chronic Male Gonorrhea.

TECHNIC

1. Irrigate anterior urethra and collect washings in Glass 1
= anterior urethra
2. Continue irrigation until washings come clear in Glass 2
= control
3. Introduce fine sterile catheter into bladder and draw one ounce of urine in Glass 3
= uncontaminated bladder urine
- 4.a) If clear, withdraw catheter; patient voids
one ounce urine in } Glass 4
b) If not clear, empty bladder via catheter;
irrigate until clear, then patient voids
one ounce of fluid in } = posterior urethra
5. Massage prostate; patient voids balance of urine in Glass 5
= massaged prostatic contents

If desired, strip vesicles separately and collect urines ^{glasses} 6 & 7, for the separate vesicles.

FINDINGS IN CHRONIC GONORRHEA

Region Involved Clinically	Condition at Meatus	LAVAGE FLUID					URINE					Prostate Per Rectum	Secretion Obtained by Massage
		Glass 1	Glass 2	Glass 3	Glass 4	Glass 5	Glass 3	Glass 4	Glass 5	Glass 5			
Anterior (Slight) Stricture Folliculitis	Discharge at AM Drop										Normal	Normal Prostatic Secretion	
Anterior (Severe)	Profuse Discharge										"	"	
Posterior (Superficial)	—										"	"	
Posterior (Severe) Involving Prostatic Ducts	—										Large and Congested	Pus and Debris	
Antero-Posterior (Superficial)	Discharge										Normal	Normal Prostatic Secretion	
Antero-Posterior (Involving Prostatic Ducts)	"										Moderately large and tender	Pus and Debris	
Antero-Posterior (Severe) Urethrocystitis	"										Very large & tender Hard or doughy	"	
Chronic Prostatitis without Urethritis	—										large, hard or doughy	"	
Chronic Prostatitis with Urethritis	Occasional Morning Drop										"	"	
Cystitis Pyelitis	—										Normal	Normal	
Prostatorrhoea Spermatorrhoea	—										Large Congested Soft and doughy	Pus and Normal Elements	

the posterior urethra; there is no way of making this differentiation with this test. In the presence of actual pus in this glass, we are unable to say whether the pus comes from the bladder and upper tract or from the posterior urethra. The original test (Wolbarst) makes this point of differentiation with absolute clearness.

Young's Seven Glass Test.*—This test was described by Young in 1904, and is a modification of the Kollmann five glass test, carried out in further detail; this test is inadequate, in that it does not employ a catheter for the bladder contents. In Young's recently published *Practice of Urology* he makes no reference to this test; the only test mentioned is the simple three glass test.

In conclusion, it should be emphasized that test and not guess should be the basis of diagnosis in urethral infections; this is especially true in chronic cases. These tests, if properly performed and intelligently interpreted, eliminate the element of guesswork and substitute for it sound data which are of the utmost value. The routine employment of these tests often will clear up the most difficult case.

Plates VI and VII graphically illustrate the interpretation of these tests. A careful study of these plates will amply repay the time and effort involved.

*Johns Hopkins Hospital Reports, 1904, xiv.

CHAPTER XV

WHEN IS GONORRHEA CURED?

This question, when is gonorrhea cured? assumes that gonorrhea *can* be cured, notwithstanding the widespread opinion that such is not the case. Gonorrhea *can* be cured and is being cured every day; otherwise we should have many more chronic cases in men and far more gonorrhea in women than we have. But it is an unfortunate fact nevertheless, that in spite of the marked advances which have been made in methods of investigation, it is impossible to say with finality that any particular patient has been thoroughly and completely cured bacteriologically.

For all practical purposes, we may with safety pronounce a patient *clinically* cured, if the following conditions obtain one month after the cessation of all treatment: The absence of an urethral discharge, especially on arising in the morning; the absence of pus cells in appreciable number in the all-night urine; normal appearance of the urethral mucosa as determined by the urethroscope; normal prostate and seminal vesicles, as determined by rectal examination and normal secretions from these organs; absence of provocative discharge after ingestion of alcohol, coitus, physical exercise and the administration of gonococcus vaccine.

When a man about to marry consults his physician for an opinion as to whether his attack of gonorrhea has been cured to the degree that it is morally and physically safe for him to marry without danger of infecting his wife, two cardinal questions present themselves for a definite answer. First, have all the gonococci been eliminated from the tissues, and secondly, are other infections elements present?

As to the presence of gonococci, it must be admitted that this question cannot be answered categorically. It has been

pointed out repeatedly that gonococci may lie dormant in the genital organs for long periods without giving any evidence or responding to any tests indicating their presence. A man may be absolutely well in the clinical sense and still may harbor latent gonococci in his genital tract, which may become activated when deposited on virgin soil. McDonagh emphatically states that no test of cure can, or ever will be devised, meaning thereby (it may be assumed), that we never shall be enabled to determine the presence or absence of latent gonococci in the tissues. Only the future can tell whether or not this opinion will be fully confirmed; it is certainly true so far as our present knowledge is concerned. Some day, some genius might discover some method or test whereby bacteria latent in the tissues may be discovered and isolated; until that happy day arrives, McDonagh's dictum must stand unchallenged. It was thought at one time that the complement-fixation test brought that day nearer; but this hope has not materialized. Gonococci still lie dormant without revealing their presence.

The second question, as to whether or not the patient is infectious is the more important of the two. For in the ultimate analysis, it matters little whether or no the patient harbors invisible bacterial organisms, so long as he remains clinically noninfectious. The test of cure is predicated on the the element of infectiousness and this element is not dependent on the presence of gonococci alone. The presence of pus cells in the genital secretions in appreciable numbers,—more than four or five cells in a $\frac{1}{6}$ objective field, is sufficient justification for the suspicion that a focus of infection persists somewhere in the body; even though no bacterial organisms have been found, the patient must be considered potentially infectious.

How is the presence or absence of bacterial organisms and pus cells to be ascertained? We have at command a number of tests whereby it is possible to secure information which will aid materially in answering this question:

1. Microscopic and cultural examination of the centrifuged morning urine (retained all night);

2. Microscopic and cultural examination of the urethral discharge obtained (if possible) by squeezing and milking the glands and follicles of the anterior urethra;

3. Microscopic and cultural examination of the massaged prostatovesicular secretion (very important);

4. Cultural examination of the seminal fluid (sperm culture); this is the most reliable diagnostic measure which can be employed in determining a cure and particularly in giving permission to marry. In the absence of clinical evidence of disease, if this test is several times repeated and invariably found negative, it is absolutely safe to consider the patient cured and noninfectious.

5. Urethroscopic examination of the anterior and posterior portions of the urethra, to determine the presence or absence of pathologic lesions in these parts. Particularly is it important to investigate the glandular orifices and the presence or absence of erosions in the anterior urethra; in the posterior urethra, the verumontanum and the orifices of the ejaculatory ducts are carefully studied.

6. Complement-fixation test: a positive reaction, reliably checked against error, may be accepted as an indication of the presence of a focus of infection somewhere in the body; a negative test does not necessarily point to a complete cure, but it is circumstantially favorable to that conclusion if it is confirmed by other tests.

When all of these tests give a negative result, we may feel morally certain that a cure has been effected.

But the evidence, after all, is circumstantial; we never can be absolutely certain, because of the nature of the problem involved. The lapse of time will tell better than the most exact series of tests, whether or not the element of infectiousness has been removed from the patient. In spite of our tests, all of which may point in the direction of noninfectiousness,

it must be admitted that we cannot insure the patient against the possibility of transmitting the infection at some future time, though we may be morally certain that this possibility is extremely remote; nor can we assure him definitely that a recurrence may not take place months or years later, under provocative conditions. The patient, with safety, may be declared cured and noninfectious, but the physician cannot assume the full responsibility and guarantee the cure. The patient must assume that responsibility. If, after a series of negative tests, the patient resumes his normal sexual life, without recurrence or producing infection in his partner, he may feel reasonably certain that the cure has been complete.

It should be remembered, of course, that experience covering hundreds of years, has shown that gonorrhea can be cured completely, sometimes within an incredibly short time. The infectious element tends to become attenuated and with the flight of time, disappears entirely. The vast majority of men who have had gonorrhea marry without infecting their wives; there can be no doubt of that. But we are in the unfortunate position of being unable to assure any particular man that *he* will be among the fortunate ones. It is because of this fact, that it is necessary for the physician to guard carefully against an undue optimism, even though all the evidence is favorable.

A careful hygienic life, with sexual rest, succeeded after several months by a moderate exercise of the sexual function, generally will help to bring about the desired extinction of the infectious element, if any trace be present. For several years after the infection has been declared cured by test, a sperm culture should be made at semiannual intervals, to make certain that there is no tendency to recurrence of the infection. If these tests prove favorable, there should be no doubt whatever that a permanent cure has been effected.

CHAPTER XVI

SEXUAL NEUROSES FOLLOWING GONORRHEA

It is universally agreed that sexual neuroses in the male are most commonly due to some pathologic lesion in the genital tract, usually in the prostate or the seminal vesicles. This condition is quite a common one, particularly in men who have more or less recently suffered from an attack of gonococcal urethritis, with involvement of the adnexa.

Quite often the patients are not able to associate their symptoms with their gonorrhea; it is likewise true that the physician, to whom they go for relief, does not, as a rule, correlate the symptoms of which the patients complain, with the lesions that have been left behind as a heritage from the uncured infection.

These cases of sexual neurasthenia following gonorrhea, while not difficult to diagnose, are not easy to cure. The specialist generally sees them after they have gone to the family physician for a long time, or after they have drifted from office to office, or clinic to clinic, without avail. Strong and able-bodied men often are rendered weak and decrepit, unable to work and miserable to the last degree, without any appreciable organic lesions to account for their symptoms. Whatever lesions are found often are in great disproportion to the extent and character of the symptoms. The latter may vary from a slight sensation of numbness or tickling in the urethra to the most marked degree of physical prostration, depression and helplessness. No two cases are alike and they rarely present similar symptoms. Every conceivable complaint is offered and the same patient returns at each visit with a new stock of symptoms. In the average case, the symptoms respond after a time to appropriate treatment, with most gratifying results.

In discussing the etiology of this condition, I have reached the conclusion that the existence of an extensive lesion in the genital apparatus is per se not enough to cause sexual neurasthenia. We first must have a predisposing "neurasthenic" soil, so to speak. Overwork, unhealthy environment, lack of proper food and hygienic surroundings, mental worries and financial stress—all combine to make a man ripe for the development of sexual neurasthenia at the slightest deviation of his genital organs from the normal. In dispensary practice, this is especially true among newly arrived immigrants, who come here leaving their wives behind and enter upon a life of constant struggle against almost insuperable obstacles. Living is attained at a terrific expenditure of physical and mental energy. The powers of resistance are lowered and the weakened nervous system is at hand to add to the damage done by the genital disorder.

As a rule, the symptoms are not limited to the sexual organs. The prime symptom is a feeling of mental depression and weakness, associated with fleeting pains in various parts of the body. Loss of appetite, sleeplessness, constipation and a general indifference to the things that formerly made life worth living, are concomitant phenomena. The most common pain is located in the urethra,—sometimes in the perineal region, but most frequently at or near the meatus. The patient very characteristically runs his finger along the lower surface of the penis, from the penoscrotal junction toward the meatus, in describing and locating his pain. In the more advanced cases these pains are constant and harassing to a marked degree, but here is an important diagnostic point: The pains do not persist at night. When the patient falls asleep, his pains do not waken him. As soon as he opens his eyes, however, his pains return. There is pain somewhere, all the time. Careful inquiry shows that the pain is more of an abnormal annoying sensation than an actual pain.

Associated with these indefinite sensations and often the only and predominating symptoms, is a more or less constant

polyuria. The urine may be voided as often as every five or ten minutes, but characteristically only during waking hours. Once he falls asleep at night, he does not feel any desire to void, as does the man with cystitis or senile hypertrophy. The urine may be phosphatic, but hyperacidity is very common. The absence of pyuria is another very important diagnostic sign.

Insomnia is a common symptom; this is often followed, when sleep does come, by unpleasant and disquieting dreams, which result in the patient's rising tired and unrefreshed and ready to begin another day's close communion with his pains, aches, and broodings.

The sexual function is a frequent sufferer. There may be a lack of sexual desire, or a partial or complete loss of potency. This is very common. It may be functional or organic. Erections may be incomplete or absent entirely; coitus, when it is possible, is accompanied by premature ejaculation. Involuntary emissions are sometimes very frequent and cause considerable mental anguish.

A dread of approaching impotence usually is associated with these functional disturbances. This dread is inculcated and fostered by the quack advertisements which these patients read so greedily. Quacks, knowing well the mental weakness of sexual neurasthenics, make a special appeal to them for patronage and therein lies their greatest and richest harvest.

Treatment.—The treatment of these diversified conditions has two distinct objects in mind; namely, to remove the etiologic lesion in the genital tract and to improve or eradicate entirely the reflex manifestations or secondary phenomena.

For the first and main indication local treatment, directed to the site of the lesion, is imperatively demanded. Wherever the source of irritation may be, the treatment should be directed to that spot. As adjuvants to this treatment, it is often necessary to resort to surgical measures, such as meatotomy, circumcision, urethrotomy, vasotomy, excision of vari-

cocoele and hydrocele. The urethroscope finds a great field of usefulness in the treatment of these conditions. Prostatic massage, electricity, diathermy, dilatation of strictures, etc., all of these measures are to be called upon, if found necessary. In this connection, it is well to repeat that some of these neurasthenics acquire a liking for prostatic massage that almost amounts to an obsession. These men travel from one clinic or physician to another, begging for a massage. Deep instillations of silver nitrate also are very effectual. In brief, wherever a local lesion can be isolated it should receive appropriate treatment.

The indications for general treatment are based along similar lines. Whenever it is possible to improve the patient's general health by any particular therapeutic measure, it should be employed; but we should not forget that near the top of the list of effective measures for this condition, is psychotherapy.

When polyuria is the predominant symptom, it usually is found associated with an hyperacid urine and an irritable vesical neck, the latter being due to a chronic colliculitis. This may be of specific (gonococcal) or nonspecific origin. It has been my experience that this form of polyuria responds most quickly to alkalization of the urine, with or without the application of local treatment to the inflamed deep urethra. In many cases, a pinpoint meatus completes the triad, and in these cases, meatotomy alone often suffices to bring about an almost immediate cure of the polyuria.

CHAPTER XVII

MALE STERILITY FOLLOWING GONORRHEA

The occurrence of sterility in the male following gonococcal infection has been insufficiently recognized. There is good reason for believing that male sterility is responsible for approximately 50 per cent of childless marriages and of this vast number gonococcal infection is the responsible causative factor in a large proportion of cases.

The following classification of the seminal fluid generally is adopted for the purpose of describing the status of the semen as regards its fertilizing capacity:

1. *Azoospermia*, in which the sperma are totally absent from the seminal fluid (often incorrectly termed “aspermia”);
2. *Oligospermia*, in which the sperma are present in the semen but distinctly diminished in number and motility;
3. *Oligonecrospermia*, in which the number of sperma is reduced and many of these are dead;
4. *Necrospermia*, in which all the sperma present are dead;
5. *Aspermia*, in which the seminal emission is slight or entirely absent and when present contains neither sperma nor other constituents of normal semen.

Etiology.—The etiology of these respective conditions as regards gonococcal infection may be classed under two heads,—obstructive and destructive.

Azoospermia most frequently is the result of an obstruction to the normal movement of the sperma from the testis into the vas deferens. This obstruction, as previously mentioned, is the result of closure of the fine tubules resulting from gonococcal inflammation of the epididymis. If the obstruction occurs on one side, total azoospermia does not follow, because

the sperma from the noninfected epididymis, having an unobstructed outlet, are capable of causing fertilization. When the epididymitis is bilateral, the incidence of complete obstruction and azoospermia is about 90 per cent.

Obstruction of the vasa deferentia and of the ejaculatory ducts is responsible for many cases of sterility. It is evident that the inflammatory process descending along the vas deferens to the epididymis, must of necessity involve both this canal, with its narrow lumen and its corresponding ejaculatory duct. It has been pointed out that the vas deferens frequently is occluded with inflammatory detritus, which may obstruct the passage of the sperma partially or completely; the same is true of the ejaculatory ducts. If the inflammation has been bilateral, azoospermia almost surely will result.

The *destructive* effect of the gonococcal infection is exceedingly great. It is a well-recognized fact that sperma lose much of their vitality when brought in contact with pus. If they are not altogether destroyed, at least they are damaged to such an extent that impregnation becomes improbable, if not absolutely impossible. In any given case in which a freshly emitted specimen of semen shows the presence of *oligospermia*, massage of the prostate and seminal vesicles, followed by microscopic examination of the expressed secretion and of the urine voided after massage, will furnish ample evidence of the presence of pus and detritus in the prostate and vesicles. This is perhaps the most common factor in the production of oligospermia.

It is clear that in the presence of a chronic inflammation of the genital adnexa with the production of pus and detritus, only a fraction of the total number of sperma secreted in the testes possess the ability to survive the destructive influence of these pathologic secretions; those which do survive undoubtedly lose much of their vitality. Examination of a freshly emitted specimen of semen shows this very clearly.

In this connection, it may not be considered amiss to express the opinion that this destructive effect of pus also may

explain in part, at least, the sterility which accompanies chronic gonococcal inflammation of the uterus and cervix. Sperm deposited in this pathologic soil, with its heavy coating of mucus, are unable to overcome the handicap imposed on them; especially is this true, when they themselves have barely managed to escape the destructive effect of the pathologic secretions in the genital adnexa of the male.

When the pathologic secretions are highly destructive, we not only find the number of live sperm diminished, but in addition, we find sperm that are lifeless,—*oligonecropermia*. Carried to a still higher degree of destructiveness, we have the condition of *necropermia*,—in which all the sperm are dead when emitted. “Spermatozoa may be motionless in chronic follicular prostatitis, for as Fürbringer has demonstrated, the spermatozoa so long as they are retained in the seminal vesicles are motionless, and it requires the contact of the prostatic secretion to arouse their normal motility. When the prostatic follicles are diseased, their secretion is checked, and the spermatozoa are deprived of the stimulant necessary to excite their activity.” (Morton.)

Aspermia appears in two forms: In the first, the seminal fluid is prevented from reaching the urethra either through obstruction or otherwise; in the second form, the semen enters the posterior urethra but is not ejaculated in the direction of the urinary meatus. In either event, the orgasm is unaccompanied by ejaculate, or it may be followed by a slight oozing or dribbling some time later.

This condition may be due in some cases, to the presence of a tight urethral stricture, which prevents the seminal fluid from passing forward along the urethra at the time of orgasm. All or most of the semen passes backward into the bladder and may be recovered in the urine. A small quantity of the seminal fluid may dribble forward slowly and appear at the urinary meatus.

In most cases, aspermia is due to an hypertrophied and congested verumontanum, which acts in the same manner as

a stricture, blocking the seminal flow and turning it backward into the bladder, instead of forward toward the meatus.

In a study of a series of cases made several years ago, I found the following data: In 87 cases of sterility in which the wife was pronounced normal, 50 per cent of the cases were due to azoospermia, 35 per cent to oligonecrospermia and 13.5 per cent to oligospermia. The most common cause of azoospermia was bilateral epididymitis (72 per cent), of which 58 per cent were gonococcal in origin; the most common cause of oligospermia were prostatitis, vesiculitis and colliculitis (58 per cent), of which 41 per cent were gonococcal in origin; the most common cause of oligonecrospermia also were prostatitis, vesiculitis and colliculitis (77 per cent), of which 51 per cent were gonococcal in origin. A close analysis of these data showed that gonococcal infection in the male was responsible for the sterility in 60 per cent of the cases studied.

Treatment.—In azoospermia due to double epididymitis, there is but one measure which offers the slightest hope of success,—epididymovasostomy or Martin's operation and its modifications. The purpose of this procedure is to obtain for the sperma a passage from the blocked testes to the vasa deferentia, on one or both sides, by joining the vas at a point near the testis to a portion of epididymis or testis proper which has been found on microscopic test to contain live sperma. The patency of the vas deferens, seminal vesicle and ejaculatory duct on the affected side is determined at operation by injecting 5 c.c. of a colored solution or a 2 per cent bicarbonate of soda solution into the vas and recovering it from the bladder by catheter. If the solution does not enter the bladder, there is another obstruction higher up in the seminal tract, probably in the ejaculatory ducts; the operation cannot possibly succeed unless this tract has been made patent. At best, the operation offers no assurance of success in removing the sterility, but it is the only chance and the patient should have it. He has all to gain if it suc-

ceeds and nothing to lose if it fails. In my personal experience, a successful outcome of the operation has been attained in about 5 per cent of cases.

When the verumontanum is the major cause of the sterility, local treatment through the cystourethroscope is indicated. It is the only means at our disposal whereby these lesions can be seen and treated. Papillomata, cysts and other tissue deposits are successfully dealt with by means of fulguration. Occlusion of the ejaculatory ducts is amenable to fulguration, catheterization with a fine filiform and vasotomy (Belfield operation); the latter acts by forcing fluid through the occluded ducts, thereby removing the obstructing pathologic debris. Occlusion of these ducts may be removed by a combined method of massage and cystourethroscopy, which I have employed with much success. I have succeeded in emptying these ducts by vigorous yet gentle massage of the prostate with a finger in the rectum while the urethroscope is in place (Fig. 74). As a result of this procedure, it is interesting to see a clump of pus and inspissated secretion emerge from a duct which may have been invisible previously. The mouth of the duct dilates and the cloud of pus shoots up under pressure of the finger in the rectum, hesitatingly at first, as though it were being held back by a spasm of the prostatic follicle. The current of water employed in urethroscopy is diminished to a minimum while massage is being done, otherwise the expressed material might pass into the rapidly moving current too quickly and thus escape unobserved into the bladder. All of this expressed material can be recovered later when the patient empties his bladder. The obstructive plugs having been removed, it is possible to pass a filiform or piano wire into the ducts for dilatation; later a fine ureteral catheter can be introduced, through which an antiseptic fluid may be injected into the vesicles. Fluid introduced in this manner often finds its way back into the vas deferens, thus medicating and disinfecting the entire infected tract.

In chronic prostatitis, when the prostate is large, soft and boggy, the amount of pus and débris expressed by massage is almost unbelievable. Local applications of a 10 per cent silver nitrate solution to the posterior urethra by means of the urethroscope and deep instillations of 1:200 silver nitrate solution by means of the Keyes-Ultzmann syringe, generally bring about a restoration of the adnexa to a more normal state and thus give the sperma a better chance to reach the urethra alive and active in the seminal fluid.

Azoospermia and aspermia due to stricture are relieved by dilatation or urethrotomy, or both combined; if there is no obstruction other than this in the genital tract, the seminal fluid will be emitted normally.

On the whole, it may be said that a large proportion of these cases of male sterility due to gonococcal infection are amenable to appropriate treatment.

CHAPTER XVIII

PERSONAL PROPHYLAXIS

It is well frankly to recognize the fact that there is but one absolutely certain, hundred per cent prophylactic against gonorrhea; that is sexual abstinence. Experience throughout the recorded history of mankind has shown that the problem always has been the same as it is today, abstain or pay the penalty; nevertheless, man has not abstained but has preferred to gamble with fate and pay the penalty.

We are told that sexual abstinence is compatible with perfect health. But even if it could be demonstrated that abstinence is compatible with perfect mental and physical health in certain types of men, the problem of prophylaxis still would have to concern itself with that much larger proportion of men who do not belong to that type,—men in whom the sexual urge is strong and imperious. In these men, the general physical and mental welfare demands a normal degree of activity of the sex function as well as other body functions. Society cannot eliminate the sex urge in virile men and women by exhortation and prayer or by legal enactment.

“The truth is rather that, although it may be possible to keep in good health without sexual indulgence, the physical efficiency of the average man suffers, and his intellectual capacity is diminished by the forcible exclusion of the sexual element. It may be necessary in the interests of society or of morality or of Christianity to continue to preach the gospel of continence. It may even be urged that, regarded solely from the standpoint of the individual, the dangers and ill-effects of promiscuous intercourse are greater than those of chastity. But to protest that complete chastity is compatible with the highest degree of mental and physical

efficiency, and that the suppression of the strongest natural instinct can be achieved without cost, is neither logical nor honest" (Kenneth Walker). In this view I heartily concur.

Personal prophylaxis need not in any manner obviate the policy of education and moral influence along the lines of proper control of the sex appetite. Self-control and protection of the innocent can be stimulated and fostered by education, precept and other means, but personal prophylaxis is urgently demanded nevertheless, for those who risk illicit exposure.

The system adopted in the German merchant marine* illustrates the extent to which the personnel may be protected against venereal infection. The captain of every ship is given a list of treatment centers in all ports which he touches. In the quarters of the crew, cards are attached to show them that such treatment centers are available at the respective ports. A pamphlet is given them to teach prophylaxis and dangers of illicit intercourse. The warnings issued are as follows:

"Never have intercourse while you are intoxicated. Never have intercourse when you have the slightest abrasion on the genital organs or when you have a venereal infection. Protect the penis during intercourse by covering it with a condom or application of a thick layer of grease. Wash the parts thoroughly with soap and water after contact. Pass water immediately after contact. The observance of these rules often hinders infection, but does not guarantee protection. Watch yourself closely during the days following exposure. Syphilis becomes manifest only after two or three weeks. Sore spots on the penis, itching or burning in the urethra, discharge of pus or serum from the urethra must be treated immediately. Delay aggravates the disease and delays cure and may cause long and painful diseases and the spread of the disease to wife and children. Follow these rules carefully and immediately."

*U. S. Public Health Service, Venereal Disease Information, May, 1926, p. 167.

Unfortunately, there is considerable opposition to personal prophylaxis and it is not confined to laymen, by any means. Some physicians object to it on moral grounds, as a "compromise with vice"; others on the ground that none of the preventive measures absolutely protects against infection; while still others believe that prophylaxis may tempt men into illicit sexual activity, with unhappy results. But it certainly is unwise, to say the least, to ignore the great value of personal prophylaxis on these grounds and particularly on the ground that absolute protection is not afforded. An ever-growing experience has shown that the incidence of venereal disease is extremely small, if the prophylaxis is administered at the right time and in the right manner.

Those who favor personal prophylaxis are not unanimous in their selection of the medium to be employed. One group favors the use of mechanical prophylaxis (condom) on the ground that its action is more dependable; also because it simultaneously protects the female partner. Chemical prophylaxis, on the other hand, is preferred by the male public, for obvious reasons; and though this method does not offer any protection to the female partner, women generally object to the use of the mechanical prophylactic but prefer to resort to chemical prophylaxis for their own protection.

As an illustration of the value of chemical prophylaxis, it is reported* that of 100,000 chemical prophylactic treatments administered in the A. E. F., at Base Area Section No. 2, Bordeaux, failure occurred in 1.7 per cent of cases. An analysis of the conditions among the troops stationed in Paris, showed that the failure when prophylaxis was taken in three hours or less was 0.5 per cent in a total of 157,000 prophylactic treatments.

Col. George Walker (A. E. F.), in this connection, reported that "the observations in the American Expeditionary Forces have proved that prophylaxis is of the utmost value, and the

*Young: "Preventive Medicine as Applied to Venereal and Skin Diseases," Jour. Am. Med. Ass'n., 1919, lxxiii, 1668.

fact has been established beyond doubt that when taken within one hour it is almost 100 per cent effective. The number of men it will save from risk far exceeds the sum total of those individuals who expose themselves with the idea that they will be rendered immune because of prophylaxis. I do not believe that the introduction of prophylaxis is antagonistic to public morals, for along with the campaign for prophylaxis, the other campaigns of general education proceed *pari passu*."

There is comparatively little risk of infection in the male, if after exposure, he is properly disinfected by chemical substances of suitable nature and strength. Any sober, intelligent man, suitably instructed, can disinfect himself thoroughly. It has been demonstrated clearly that a specific anti-septic is not essential for specific prophylaxis. All that is required is that the medium employed shall exert a disinfectant influence upon the mucous membrane of the urethra without producing local chemical irritation.

Above all, prophylaxis must be administered as soon as possible after exposure,—not later than one or two hours preferably. In other words, stop the venereal disease before it begins. The longer the delay, the greater the chance of failure.

It is essential, of course, that governmental authority should exercise supervision over the manufacture of all chemical prophylactics to the end that the public may be assured of the potency and efficiency of the product from the standpoint of prophylaxis.

Prophylactic stations, as established in various European cities, seem not to have been so successful as had been anticipated, for various reasons. The most satisfactory results have been attained, however, by the employment of the prophylactic packet, carried on the person by the individual and available immediately or shortly after exposure.

The "packet system," has been opposed by some who prefer the establishment of prophylactic stations. A New

Zealand Committee, investigating this subject, condemns the packet for these reasons: (1) It suggests a moral sanction to vice; (2) it may deter the individual from seeking early advice or treatment; (3) it gives a false sense of security and may lead to more frequent exposure; (4) it may be used for treating the disease should it arise, and thereby delay skilled treatment in the early stage when professional care is most needed. It is obvious, however, that these objections do not stand up under careful consideration of the main purpose to be attained. The purpose of prophylaxis being the prevention of venereal disease, since men will indulge illicitly under any circumstances, it is perfectly clear that the logical step is to provide something that can be conveniently carried about or easily obtained, something that will mitigate the evil and reduce the risk of infection. Experience has shown that men will not go to prophylactic stations, whereas they will use the packet, because of its convenience and the absence of the publicity connected with the prophylactic station. As an illustration of this fact, it may be mentioned that the city of Rochester (New York) established several prophylactic stations, but they were quickly given up because of the absence of applicants for treatment. Other cities have had a similar experience.

Since the introduction of calomel for syphilis prophylaxis by Metchnikoff and silver nitrate and protargol by Credé and Blokusewsky for use against gonorrhea, various prophylactic units have been perfected. These contain antiseptic substances in combination with calomel, and have been found extremely valuable against both diseases. It was observed that Metchnikoff's calomel pomade (calomel 1 part, lanolin 2 parts), combined with a nonirritating mild antiseptic, acted as a prophylactic against gonorrhea when applied to the fossa navicularis, and against syphilis when rubbed over the penis.

One of these packets, made in this country and known as Andron, has been officially adopted by the Pennsylvania State

Board of Health and is widely used in the United States Navy. Its ingredients are calomel, lanolin, phenol, camphor and benzoinated lard. The literature accompanying this valuable product must be considered a potent factor in the control of venereal disease. Quoting: "Prevention is better than cure. Avoid venereal disease. You can do it. The best and safest means is abstinence from illicit intercourse, which practically always carries the risk of contagion with it.

"If you expect to marry a clean woman and have clean, healthy children, your best and surest course is to bring them the same clean health you hope for in your children. But if for any reason you have been exposed to contagion, then use preventive measures immediately Use your preventive treatment as soon after intercourse as possible, at any rate within one hour But remember that no means of preventive disinfection can ever take place of abstinence. Andron is intended as an emergency protection."

In the European countries, especially in France, these prophylactics, based on Metchnikoff's cream, have been very popular and successful. In the United States, their use is increasing constantly, though there has been no encouragement of any account in this direction by official or lay bodies interested in the antivenereal disease movement.

It is interesting to note that manufacturers of these packets do not make extravagant claims as to the efficiency of their product. On a slip of paper accompanying each tube or packet of Sanitube, one of the American preparations, is the following: "The use of this product is not to be construed as a license to exposure. All exposures should be considered as infectious. Ninety per cent of 'easy women' are infected. The only sure way to prevent infection is **DO NOT EXPOSE YOURSELF**. If exposed, use this package as directed, within one hour. Arrest of infection will result in many instances, as the action of the contents upon the germs is as effective as can be secured by the latest scientific knowledge." Surely, there can be no objection to placing a packet with such sound

advice in the hands of every individual who exposes himself to possible infection.

A packet which has a widespread use in England and on the continent contains an improved calomel base made by precipitation and is known as Calomex. It is prepared on the formula of Duret, of the Pasteur Institute, Paris, and contains thymol, camphor and magnesium, in addition to 33 $\frac{1}{3}$ per cent precipitated calomel. This preparation has been highly recommended not only as a prophylactic but for healing lacerations and excoriations on the genitals.

For the prevention of infection, the patient voids the urine immediately after exposure, washes the parts thoroughly with soap and water, and then presses half the contents of a tube into the urethra, rubbing the rest upon the penis back to the hair line. It is still better to apply the ointment on the penis immediately before as well as after exposure, especially over any visible excoriations on the skin. The ointment is permitted to remain on the skin for a number of hours. Reports from authentic sources agree that the widespread use of such a prophylactic as this would rapidly decrease the incidence of gonorrhea and syphilis.

For many years, it has been my practice to provide prophylaxis against gonococcal infection, in cases of illicit exposure in which self-prophylaxis has not been used, for one reason or another. Within twenty-four to forty-eight hours after exposure, the anterior urethra is thoroughly flushed with a warm antiseptic solution, or injected with a mild silver salt solution, retained ten or fifteen minutes. In an experience covering many hundreds of such treatments, not a single case of infection has occurred.

Ballenger and Elder have practiced a method of chemical prophylaxis for twenty years, which they say, invariably is effective, even though it be employed twenty-four to forty-eight hours after exposure. They recommend that a 5 per cent solution of one of the silver salts be sealed in the urethra

with collodion and thereby kept in contact with the urethral mucosa for three to five hours. A single treatment of this kind is all that is required to prevent gonococcal infection. Of course, this method is of no avail against infection with syphilis. In this regard the chemical packets on the market are superior, in that they protect against gonorrhea and syphilis.

CHAPTER XIX

GONORRHEA IN MALE CHILDREN

It is commonly stated that the source of infection in juvenile cases, usually can be traced to the use of soiled linen, infected water-closet seats and infected catheters,—the last source applying to hospital and institutional cases. A careful inquiry made some years ago, however, convinced me that direct sexual contact is responsible for the infection in a large proportion of cases. Especially is this true in districts in which the poor are crowded together in tenements, where the children at an early age are alive to the enjoyment of sexual contact and where the dark cellars, water-closets and roofs offer ample opportunity, first for experiment, later for gratification.

It is not at all uncommon for boys and girls who have not yet attained the age of puberty to indulge in sexual gratification. Contact with older boys and girls who have had their curiosity satisfied by actual sex experience, stimulates their sex appetite at an age when impressions are easily made and habits formed. The result is a precociously developed sex appetite, which they find it not difficult to gratify.

In about one-half the cases studied, there was an undoubted history of infection by direct sex contact; in some cases, the infection was traced to the child sleeping in the same bed with an infected parent, brother, sister, or a boarder. The promiscuous mingling of the sexes in crowded tenements is largely responsible for the occurrence of these cases.

A number of cases in the series admittedly were the result of acts of pederasty, a practice not at all uncommon among highly sexed children. Still other cases were infected as the result of a superstition widespread in Europe, to the effect that an infected adult can be cured of the gonococcal infec-

tion by cohabitating with a virgin of the opposite sex. The age of the children in this series ranged from eighteen months to fourteen years.

Whatever the cause of the infection might be, the period of incubation and the general character of the disease do not differ from those seen in the adult. Pain, urethral discharge, in which the gonococcus is found, burning sensations on micturition, increased frequency and even complete retention, are the usual symptoms. Objectively, we have the red, swollen and puffy meatus, typical of acute gonococcal infection.

The pain which some of these children suffer, often is out of all proportion to the clinical picture presented; but this hypersensitiveness usually is found to be coincident with the presence of a contracted meatus or a long and tight foreskin, both of which serve as a dam to the secretions, thus preventing proper drainage of the urethra and intensifying the inflammation. Other children, on the other hand, suffer very little pain and merely exhibit a discharge of pus from a reddened and swollen meatus.

Complications similar to those occurring in the adult are not infrequent. Prostatitis and epididymitis are quite common; complete retention of urine is rather frequent, if the prostate is involved, and may require catheterization; the prostate is enlarged and extremely sensitive, causing much pain on urination and defecation. The epididymis, when affected, also is swollen and very painful. Arthritis occasionally occurs, but it is quite rare.

In general, it may be said that the disease presents the same symptoms and complications as those observed in the adult; the duration of the disease likewise is the same.

The prognosis as to complete recovery seems to be better than in the adult. In young boys, there does not appear to be that tendency toward chronicity and stricture so characteristic of the adult infection.

Treatment is identical with that employed in the adult, except that the greater sensitiveness of the child's inflamed urethra may demand the use of weaker solutions. In my experience, the best results have been attained through the use of the silver salts administered by hand injection, several times daily, and retained five to ten minutes. An alkaline solution internally, relieves the urethral pain and urinary tenesmus.

The primary requisite for proper treatment is cleanliness, carried to the surgical degree. The cleansing of the parts not only aids in bringing about a cure but tends to prevent the occurrence of complications. In the circumcised child, this is not so difficult a matter as it is in the uncircumcised. The presence of a foreskin, especially when long and tight, adds materially to the task of keeping the parts clean and encourages the development of complications.

If complications supervene, they are treated in the same manner as in the adult.

Particular precautions should be taken to prevent the discharge from being carried to the conjunctiva and other mucous membranes by the child's fingers.

CHAPTER XX

VIEWS ON GONORRHEA

By MR. J. E. R. McDONAGH, F.R.C.S., London, England.

I would start off by saying, that since the war gonorrhea has become a more serious condition and the percentage of complications following a simple urethritis has increased. This is due to the severe local treatment to which the patients of today are subjected. No prostate should be examined while a patient has a discharge or an acute complication and no instrument should be passed down the urethra. The prostate should never be roughly massaged and there is practically never need to pass a metal instrument *intra urethram*. Urethroscopy does not expose a lesion in the prostate or vesicles, treatment of the urethra by means of it is unsatisfactory and almost every case of urethral fibrosis can be overcome by the passage of Teevan's gum-elastic catheters and intramuscular injections of the carbon disulphide product of diethylamine (contramine). Another point not realised sufficiently is that practically every case diagnosed as a second or third attack is really a first or second recurrence of an initial attack, which has not been cured. The gonococcus may remain dormant for many years and this it is enabled to do by taking up an intracellular habitat. Gonococci seen in a polymorphonuclear leucocyte are living at the expense of the leucocyte and are not being subjected to phagocytosis as is usually thought. Gonococci are able to enter such low-grade cells so to speak, as the polymorphonuclear leucocytes, because they are able to cause a greater lowering of the surface tension of the leucocytes than the leucocytes are of them. It is because of this that the microorganisms are gram-negative. Secondary organisms play a greater rôle in producing

the discharge in a recurrent case than do the gonococci and this explains why recurrent attacks of gonorrhea are so seldom infectious.

The infectivity of gonorrhea has been grossly overestimated. In view of the fact that gonococci may remain dormant in the host's cells, it is impossible to say when a patient is cured. But, this is unimportant, because what one really wants to know is not whether a patient is cured, but whether he is infectious or not. No test of cure can, or ever will be, devised. The gonococcus when it enters the body first causes a local lesion and it seldom gives rise to a metastatic lesion until a relapse appears. This applies also to complications arising by extension, such as epididymitis. But, even though the organisms may remain in the lesion produced first, "poisons" may enter the system therefrom and cause changes in the protein particles in the plasma sufficient to cause ill-health. It is not uncommon to find men who are harbouring the gonococcus to complain of gastritis, headaches, depression and a diminution of vigor for work and games.

Treatment aimed at destroying the gonococcus never does so directly, it only increases the patient's resistance and stimulates his protective substance (the protein particles in the plasma) to rob the gonococci of their electricity instead, which results in the organisms undergoing lysis. Robbing gonococci of some of their electrons diminishes their power to decolorize methyl violet, thereby explaining why under treatment and in chronic cases gram-positive gonococci may be found. Since gonococci cannot be vanquished directly by treatment, the need for urinary antiseptics, douching and syringing fades into insignificance. Indeed, if washing out the urethra is so essential, why are not nasal douches employed in every case of rhinorrhea? Excessive local treatment, particularly with strong antiseptics in cases of nasal catarrh raises the incidence of sinus infection and the same procedure in urethritis increases the risk of complications

occurring. Therefore, in acute gonococcal urethritis, the patient need do no more than to syringe himself twice a day with a 1 in 10,000 solution of potassium permanganate. When the discharge is due to secondary organisms a 1 in 10,000 solution of mercury oxycyanide should be used. To increase the general resistance every patient presenting himself with an acute discharge should receive two or three intramuscular injections at five-day intervals, each of 0.002 gm. of the symmetrical urea of meta-benzoyl-meta-amino-benzoyl-1-amino-8-naphthol-3-6-sodium sulphonate (Sum 36). These injections should be followed by a course of vaccines. In the majority of cases Sum 36 stops the discharge at once and relieves the patient of his subjective symptoms. The drug acts by conveying electrons to the protein particles (host's protective substance) which have been robbed of the same by the microbe invasion. Vaccines act by breaking up the enlarged and clumped protein particles, thereby restoring them to the circulation with an increased negative charge and Brownian movements. Therefore, for a vaccine to be efficient the bodies of the bacteria must be subdivided into as tiny particles as possible, because the smaller the particles become, the greater is their negative charge and enlarged protein particles can be broken up only by such charged particles. If the particles of the vaccine are not small enough they still further increase the size of the host's protein particles and occasion what is known as a "negative phase."

In acute complications of gonorrhea by extension two intramuscular injections of the symmetrical urea of para-benzoyl-para-amino-benzoyl-1-amino-8-naphthol-3-6-sodium sulphonate (Sup 36) each of 0.01 gm. should be made at three days interval. In the case of periurethral abscess and cowperitis, no incision should be made until the abscess has pointed, for fear of causing a fistula. Sup 36 if prescribed in time will abort the lesion. The same applies to acute prostatitis and epididymitis. A prostatic abscess seldom needs incising because the majority burst spontaneously into the urethra.

Such an event may result in the disappearance of the gonorrhea, because in the first place the pus is formed by secondary microorganisms and not by the gonococci, and in the second place the invasion of organisms lower in the scale than those causing the initial infection tend to exterminate the latter. This is the explanation of the malarial treatment of general paralysis. In cases of epididymitis one intramuscular injection of contramine (0.25 gm.) should be prescribed five days after the second dose of Sup 36 with the object of reducing the fibrous nodule which forms in the epididymis to the minimum. A course or two of vaccines should follow the chemotherapeutic preparations. Sup 36 is invaluable in all acute inflammatory lesions and is superior to the drug I introduced before, namely manganese butyrate. Gonorrheal ophthalmia is treated best with colloid silver locally and by two intramuscular injections of Sum 36.

Gonorrheal rheumatism responds in an extraordinary manner to contramine. In the acute cases, four intramuscular injections of contramine each of 0.125 gm. should be made every other day, followed by four small doses of vaccine and then a series of contramine and vaccine alternately until the trouble has cleared up. In chronic cases, two or three injections of contramine each of 0.25 gm. should be made at five-day intervals. No joint, however acute, should be put upon a splint, as adhesions form quicker in a gonococcal than in any other infection. No treatment of the urogenital tract should be undertaken while the patient has an active arthritis. Gonorrheal rheumatism like any other complication may usher in a recurrence before a urethral discharge becomes apparent. Another clinical point of some value, is that a unilateral or bilateral conjunctivitis is a common harbinger of polyarticular gonococcal arthritis. Patients whose resistance is incapable of being stimulated should not receive injections either of chemotherapeutic preparations or of vaccines. Gonococcal septicemia which more commonly complicates an initial attack than a recurrence is best treated with

auramine, a di-phenyl methane dyestuff and the symmetrical urea of para-benzoyl-para-amino-benzoyl-1-naphthylamine-4-6-8-sodium sulphonate (Sup 468). Auramine should be injected intravenously on two successive days in 0.1 gm. doses and Sup 468 intramuscularly in 0.001 gm. doses until the patient recovers. But, once endocarditis has become established, treatment is useless. Just as Sup 36 is invaluable in influenza, bronchopneumonia, pneumonia, certain of the toxemias of pregnancy, acute venous thrombosis, canine distemper, etc., so is contramine in the forms of rheumatism other than the one occasioned by the gonococcus. Indeed, contramine is called for in every case where there is a desire to get rid of adventitious fibrous tissue, or to put it succinctly, in every case where potassium iodide would ordinarily have been prescribed.

These points are appended to show that there are not several diseases, but only one disease. Those requiring further information regarding the unitary view of disease should read Parts I and II of "The Nature of Disease," published by Heinemann & Co., 20 Bedford Street, London, W. C. 2. The drugs mentioned in this chapter can be obtained from the British Drug Houses, Ltd, 16-30, Graham Street, City Road, London, N. 1.

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